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2 — Book 1

**SRA**  
**MATHEMATICS**  
**LEARNING SYSTEM TEXT**



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## Canadian Publication

### MATHEMATICS LEARNING SYSTEM

The Canadian publication of *Mathematics Learning System* is completely metric.

On the pages listed below, the answers given in the Teacher's Guide are numerically correct for the questions in the pupils' text. However, the questions have been changed to use only metric units.

Page 107 The answers now refer to loaves of bread, not miles.

Page 116 The answers are now items in collections, not pounds.

Other changes that have been made in the pupils' textbook for Canadian use do not affect the teaching of the program.







**Teacher's Guide**  
**Level 2 Book 1**

# **SRA**

# **MATHEMATICS**

## **LEARNING SYSTEM TEXT**

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▲ Where teachers and students worked with consultants as part of the prepublication study: Los Angeles City Unified School District; Oakland (Calif.) Unified School District; Aurora (Colo.) Public Schools; Atlanta (Ga.) Public Schools; Winnetka (Ill.) Public Schools; Elkhart (Ind.) Community

Schools; Quincy (Mass.) Public Schools; Board of Education of the City of New York (Brooklyn); Galveston (Tex.) Independent School District; and Metropolitan Separate School Board (Toronto, Canada). They shared in the development of the program.

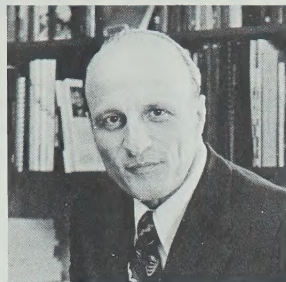
● Locations of schools that participated in the second year of prepublication testing. They verified the revision of the first year's materials.

★ Locations of authors of the SRA MATHEMATICS LEARNING SYSTEM

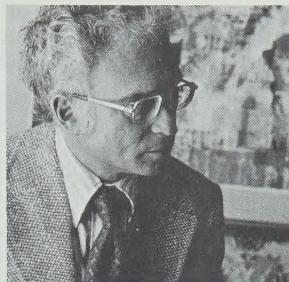
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## introducing the authors



**M. Vere DeVault**  
Professor of curriculum and instruction at the University of Wisconsin. He brought to the program a comprehensive knowledge of mathematics education, teacher education, and instructional systems, as well as elementary school teaching experience and writing skill.



**Herbert J. Greenberg**  
Professor and chairman, Department of Mathematics at the University of Denver and head of Denver Research Institute's Mathematical Sciences Division. He has given of his professional experience in applied mathematics, guided by the conviction that mathematics must be viewed by students as meaningful and applicable.



**Helen Frehmeyer**  
Master teacher and educational consultant, totally involved with teacher training throughout the United States and Canada. She has drawn on her vital, practical knowledge of the needs of schools, parents, teachers, and students in the contemporary school environment.



**Stanley J. Bezuska**  
Director of the Mathematics Institute and professor of mathematics at Boston College. He has provided his expertise as an outstanding academic mathematician. Involved for many years with the training of teachers, he is respected for his outspoken positions on the direction of mathematics education.

# Thank You

Science Research Associates, Inc., and the authors want to say THANK YOU to a group of people who helped tremendously in the development of this system. The whole thing started way back in 1969.

Juanita Tolson, experienced public school and college educator in Washington, D.C., and J. Fred Weaver, author and professor at the University of Wisconsin, were asked to review SRA's existing basal mathematics program, tell us bluntly what was wrong with it, and recommend what should be in the next basal series. They did. We listened.

Jeremy Kilpatrick, Columbia University Teachers College, was asked to share his knowledge of problem solving in elementary mathematics and tell us what could be done to improve problem-solving materials. This was a hard job. He tried. We tried.

Classroom teachers Norma Jean Cheek, Joy Craig, Fran Engelbrecht, and Jane Hawley tried out new ideas before manuscript was prepared for field testing.

John C. Egsgard, well-known Canadian educator, helped us think through the best way to develop the geometry strand so that applications would be natural and valid. He brought to our attention the outstanding work done by the Ontario Institute of Curriculum Studies and unselfishly shared his own thoughts and efforts.

George T. Duncan, University of California at Davis, was asked to do a huge job: to construct the probability and statistics strand for the entire program. His approach was refreshingly simple and understandable. It's not every day that you can find a specialist in this area who can have empathy for the young child and his thinking process and yet handle the subject with expertise.

Jerome D. Kaplan guided the work of gifted educator-writers from Educational Analysis and Evaluation, Inc., who prepared some of the chapters.

Irving Morrisett, of the Social Science Educational Consortium, was asked to react to an approach involving economics. He said don't. We didn't.

Teachers from the Montreal Catholic School Commission and William Bober, supervisor of mathematics for the Edmonton Catholic School Board, tackled the huge job of reviewing all of the final, revised manuscript used in the verification study. Their efforts gave us still more information to consider as the pages received their finishing touches.

The Mary Beck School, Elkhart, Indiana, put the verification-study materials into their nongraded, personalized education structure. They gave us insight into the various management techniques that could be used with these materials. Charles Walker assisted us from an administrator's point of view. Leo Anglin, consultant in the developmental tryout, transferred his efforts and enthusiasm to the verification study.

Ralph W. Tyler, trustee and director emeritus of the Center for Advanced Study in the Behavioral Sciences, has given generously of his time and ideas

to the people directly responsible for developing this program. His knowledge of today's problems and his dream of tomorrow's education encouraged us every step of the way.

We couldn't possibly find the right words to thank all the people in the developmental field-study schools who worked so hard and responded so honestly throughout 1971 and 1972. It's hard to tell who was the most blunt, the 75 teachers or the 2700 kids. They told us what was wrong—and what was right.

The information from nearly 700 teachers and 20,000 students in schools throughout the United States and Canada who participated in the 1972/73 verification study gave confidence that the revision of the first year's testing was effective.

Other teachers dug into their bag of tricks and contributed tried and tested classroom activities. Many thanks to James K. Bidwell, Philip Cox, Thomas S. Davis, Frances Greenberg, Muriel Greig, Bettye Hall, Donald Kamp, Evelyn Kozar, Kay Nebel, David O'Neil, Louise Petermann, Madolyn Reed, William Swart, and Judy Tate.

Literally hundreds of people in SRA have shared in the development of the SRA MATHEMATICS LEARNING SYSTEM. They all cared enough to do their very best. The editorial staff did even more. Special thanks to those exceptionally talented and dedicated people.



# Preface

*How was the SRA MATHEMATICS LEARNING SYSTEM developed?* Writing was almost the last step. We started by listening.

We visited schools of all kinds, from the inner city to remote rural areas. We sat in classrooms. Teachers, children, and parents told us about what they liked and didn't like about math programs.

We asked an independent research organization to interview supervisors and administrators. We talked to SRA Staff Associates about the needs they saw.

We reviewed all major basal math series. We studied standardized tests to see what children might be expected to know at various ages. Consultants evaluated existing SRA programs.

We also analyzed recommendations and reports from curriculum study groups, state and city adoption committees, and researchers in a variety of fields.

Then our authors, editors, and consultants worked together to prepare the rationale and learning objectives for the SRA MATHEMATICS LEARNING SYSTEM. Writing of the program did not begin until the entire scope and sequence had been defined by the learning objectives.

The manuscript was continuously reviewed, discussed, and revised by our development team. But it's arrogant for adults to sit in an office and predict what will work in the classroom. We needed answers to three questions:

- Will pupils attain the objectives?
- Will pupils develop positive attitudes toward the program?
- Will teachers find the program easy to use?

Our next step was to undertake two years of prepublication tryouts. We carefully selected classrooms across the United States and Canada to represent the broad range of pupil abilities, family backgrounds, and teaching styles. We visited, surveyed, listened, and tested. We rewrote and revised and retested before going to press with the program you see today.

We're confident that you'll find the SRA MATHEMATICS LEARNING SYSTEM effective, enjoyable, and easy to use. One of our tryout pupils wrote:

*I liked the program and nothing was hard or difficult. I think the book should come out to the world.*

*What makes the SRA MATHEMATICS LEARNING SYSTEM a "system"?* The word *system* has many definitions. We call the SRA MATHEMATICS LEARNING SYSTEM a system because of the following five characteristics:

1. The entire program is based upon well-defined learning objectives.
2. Although the program can be enriched in many ways, the texts are complete in themselves. The teacher is not required to use any other materials.
3. There is a comprehensive evaluation program in each text.
4. Learning alternatives are provided for teachers and pupils who wish to use them.
5. The program provides information about the learners that will guide the teacher in altering or expanding a learning sequence.

*What kind of objectives are there?* Objectives are given for each chapter. Key to the program, however, are the year-end mastery objectives. These are the goals toward which instruction is directed.

Distinguished educator Ralph Tyler helped with the difficult task of defining learning objectives. He told us: "Remember the purpose of objectives. They are to guide, not dictate. Think of them as goals to be reached as a result of the teaching-learning process.

"Keep the number of objectives for any level under thirty, if possible. The teacher should be able to remember them all. A teacher who has to search through hundreds of objectives to figure out what to do cannot be free to teach anything more than bits and pieces.

"Avoid fashionable formulas for writing objectives. Fashions change. Avoid jargon. Keep the language simple. Objectives have to say something or their value is lost."

*I liked the whole book because it told me things that I didn't even know about and it was very interesting.*

*What are the texts like?* The SRA MATHEMATICS LEARNING SYSTEM focuses on the real world and develops many concepts from real-world situations.

Compared with other programs, this program spends a longer time on an idea and its related skills before introducing another topic. This gives skill competency a better chance to develop.

*I like the S.R.A. math book because it's not just plane<sup>old</sup> geometry it you can gives you more time to think.*



There are many invitations for pupils to think as well as to do. Not all questions are meant to be answered. Some questions have many answers; some have none.

*I liked this section they had fun math sentences and they made you think. Math is getting a lot easier and it's funner to, math really is fun.*

The language is informal. Purists may object to this departure from standard textbook English, but our tryout pupils responded enthusiastically to the style. Instead of stressing technical vocabulary and symbols, the program emphasizes skills and nonverbal understanding.

No pupil should have to moan, "Aw! It's the same old stuff," when he flips through his math book. The pages of the SRA MATHEMATICS LEARNING SYSTEM are varied. They're lively. They look like fun.

*How are the texts organized?* There are three major types of chapters.

**Exploratory** In an exploratory chapter pupils play with a big idea, think about it, and share their own ideas. The necessary vocabulary is introduced, along with some of the notation and operations related to the major idea.

**Instructional** In this type of chapter pupils begin the serious business of acquiring skills. Ideas are carefully sequenced into learning steps, and each learning step is accompanied by practice.

**Review** Here pupils must demonstrate understanding and skills. There is a review of the learning sequence, along with opportunities to explore applications.

No one text contains all three types of chapters for a single concept strand. For example, there are exploratory and instructional chapters on addition of

whole numbers in level 1. The instructional chapters continue through level 4, and the review chapters start at level 5.

*How are pupils evaluated?* The evaluation program is built into each text. It allows a learner to check his own progress and determine his own strengths and weaknesses.

The first pages of an instructional chapter contain an informal survey to find out what the learner knows about the chapter to come. These pages indicate what the chapter is about, and they help to define the learning goal of the chapter.

The tests within an instructional chapter are called Progress Checks. A Progress Check identifies the knowledge that is a prerequisite for further work.

*After learning from your math book I found this test very easy I found it easy because I learned from your book this is what made it easy.*

A Progress Check can serve two functions:

1. If a pupil has gone through the preceding instructional pages, a Progress Check tells whether or not he has acquired the appropriate knowledge and skills. If he hasn't, he should try other kinds of instruction.
2. If a pupil seems to have prior knowledge of the chapter, as indicated by the survey at the start of the chapter, he may go directly to the Progress Check. It will determine if the preceding instructional pages can be skipped. If he's not successful on the test, he simply goes back to pages he skipped.

At the end of every chapter a Checkout lets the pupil and teacher know whether the learning objectives of the chapter have been reached.

*What learning alternatives are there?*

There's a limit to the number of pages in a textbook. Beyond a certain length the book becomes too expensive and hard to use. So only a few pages can be devoted to extras for pupils who need more help or who would benefit from additional activities. To make sure these important extras are available, we've supplied a wealth of reinforcement and extension activities in the Teacher's Guides.

*The SRA MATHEMATICS LEARNING SYSTEM was built on some simple convictions.* Mathematics is relevant and vital. It's useful and interesting. Everyone should relax and enjoy it.

*I like math a lot more than I did last year.* Some of the greatest learning opportunities are found in everyday things and are discovered when people talk together.

*I liked the chapter because I think we learned the most and because we had a lot of discussions.*

Mathematics doesn't have to be formal and abstract to be good mathematics.

*I think this math is very good because I know what I'm doing*

Everyone—students and teachers—should succeed in mathematics.

*I liked it very much I never learned this kind of measures but I think it is good that you wrote it in the book because soon America will learn the new kind of measure and you already are teaching it to us.*

A textbook can't transmit the joy of learning as well as an enthusiastic teacher, but it can help.



# Notes & Things

You will see a page that looks like this at the start of each new chapter. It's an overview of the math ideas to come and a listing of the things you will want to have on hand for the lessons. Let this page be an overview.

The youngsters will have some big jobs to do this year. They will make sure that they have mastered both the addition and subtraction facts and then will go on to learn how to add or subtract any two 2-digit numbers. The children will continue to explore the concept of fractions and will get very good at writing those special numbers.

The world of geometry will open still wider as the youngsters sort through objects they can find all around them. The shapes of the objects will begin to fit into categories. The everyday world will also be the stage for measurement experiences. They will have fun with metric system activities. And what a joy it will be to learn even more about money. The youngsters won't turn into clock-watchers but the idea of time and the ways it can be recorded will become meaningful. The combination of new skills and new ideas should fill every child with the glorious feeling of achievement.

This material has been called a gentle program with high expectations. The most important feature of any book is that there is time to explore, study, and come to some point of understanding and skill before going on to the next idea. In this program there is time and opportunity for success.

The children will need you to guide them every day. They will have lots of chances to show off how much they have learned and will look to you for help when they discover things they need to work on some more.

This guide is a simple book. Each pupil page appears in the guide exactly as it does in the pupil book except that it is slightly reduced in size. The answers are in place right where they should be.

You will find the following information in the margin beside each pupil page:

**lesson** The pages indicated here are related but need not all be presented on the same day. They provide the continuity of experience necessary to get an idea established.

**goal** The words needed to turn this goal into a behavioral or performance objective have not been printed, although they could have been. The line simply helps you pinpoint the learning task for the page.

**memo** You won't see this entry very often but when you do, please take time to read it. Sometimes you are warned about a potential problem, or there's an explanation of why something is done the way it is, or it may be simply a suggestion to make your work a bit easier.

**things** All the materials that you'll need to follow the suggestions for the page are listed here.

**warm-up** You can guess where this label came from. If the math idea is a new one or maybe a hard one, a suggestion is made that will help get the learners ready to learn.

**page 1** This tells only one way to deal with the page. You may have a much better idea or a way of handling the page that is just right for your style of teaching. If so, do your own thing.

As you flip through the pages you will see a lot of sentences in *italic type*. These sentences are intended to give you some ideas about the words you might use to talk about the page. (How many times have we all thought, "I understand, but I don't know what words to use to explain it"? ) In talking, probably nobody would use the exact words that are given. They are not meant to be a script. Sometimes the questions won't even be right for your group. They are offered as a guide, nothing more.

You will find the new concept-development words in SMALL CAPITAL LETTERS, and some other functional words that deserve emphasis will be **in this kind of type**.

Now flip through the book again. Notice the copy below the pupil pages. There are 3 types of activities. Each type has its special symbol.



The old familiar red *stop* sign will signal an activity for the youngster who simply needs more work before he goes on.



The yellow *divided highway* sign signals an activity for those youngsters who can accept a challenge beyond the learning expectations of the page.



The new, blue *rest area ahead* sign signals an activity you can use with any group. This type of activity departs from the standard math work and gives everyone a chance to have some fun.

Here you will find the ideas that will extend the lessons and suggestions that offer specific help for those children who need it. Each activity was carefully selected so that you could have something special to personalize each child's learning. These activities rarely require unusual equipment and most of them are enjoyable as well as helpful.

You'll find a Resource Section at the end of each chapter. This provides alternate forms of all progress checks and the checkout, still more activities, and you will usually find references to additional learning aids that are correlated to specific chapter objectives. At the end of each guide book you'll find a description of the other learning aids, and a bibliography that lists children's books and film medium references. These features were planned to help you with your job of teaching and the children's job of learning.

The Teacher's Guide is split into two volumes. Teachers told us they didn't like to carry a big book around all year; the spiral-wire binding snagged a lot of clothing; and it was really a great feeling to complete a book (even though there was another one to follow). It made sense to us. Hope it does to you.

Another request was to have the guide page numbered the same as the pupil page. That was not such an easy request to handle, since there are teacher resource pages at the end of each chapter and some pages of introduction to the next chapter. But that request made sense too, so we put the alphabet to work.

Suppose the first chapter in the pupil book ends on page 50, the Teacher's Guide resource material fills two pages at the end of the first chapter, and two more pages contain the introduction to the next chapter. The page numbers in the guide would go like this: 50 is the last page of chapter 1 pupil material; the first page of the teacher's resource section is 50a; the second page is 50b. The pages of introduction to chapter 2 continue in the same way. The first page is 50e; the second is 50f. Finally we are back to the first page of the next chapter in the pupil book. It is numbered 51 and so is the guide page. It won't be so bad once you get used to it.

As a teacher, you are always trying to find a way to record a pupil's progress and to report this progress to the child's parents or to his next teacher. So at the end of the second guide, on pages 256g and 256h, you will find two forms that you are free to remove and reproduce as is, or adapt the form if you like.

## here is a suggestion

The manipulation of real-world objects will help motivate children to learn. There are very few store-bought manipulatives that are better than the "junk" that can be collected. The bonus is that the junk is part of the child's world. You may want to plan ahead and start collecting some of the things you will want later in the year. Members of your class will love to help you.

The managers of the grocery store and variety store, as well as the druggist, will save all sorts of boxes, trays, and other containers for you.

Determine the storage space in your room. Get at least two large boxes to start with. Mark them MEASUREMENT and SHAPES. You won't need everything on these lists, but what a joy it is to have extra stuff available to challenge the learner's thinking.

### measurement box

calendars—clocks beyond repair, but with hands that still turn—clock measuring tape—cord, string, or rug yarn—measuring cups—metre sticks—milk containers—ribbon—rulers—some kind of scale

### shapes box

boxes of all sizes and shapes (butter, cereal, hosiery, facial-tissue, gift, paper-clip, and so on)

related flat rectangular and square shapes (floor tile, cardboard, paper trays, old playing cards, and so on)

cylinders of all sizes (tin cans, plastic bottles, baby-food jars with covers, plastic food containers, paper cores—from rolls of waxed paper, toilet tissue, paper towels—and so on)

related flat circular shapes (plastic lids from pet-food and coffee cans, coffee filters, paper coasters, paper plates, and so on)

And you will want some plastic baskets like the ones strawberries come in as well as different-sized balls, some balloons, cone-shaped paper drinking cups, and many scrap pieces of lumber.



Maybe you will want another box for supplies such as adding machine tape—index cards—magazines—mail-order catalogs—newspapers—plastic or paper bags—rolls of wall paper—sorting trays (TV-dinner trays or the divider trays used in shipping citrus fruit, for example).

Use plastic food bags to bunch similar items such as beads—blocks—bottle caps—buttons—clothespins—coffee stirrers—dried beans—drinking straws—hard-shell nuts (acorns, chestnuts, pecans)—pebbles, rocks, or shells—pinecones—pipe cleaners—plastic-foam packing chips—plastic spoons—tongue depressors—toothpicks—shelled corn—wrapped hard candies. These bags will also serve as counters.

It's O.K. if you don't have time to start your junk boxes now. There will be fair warning to you at the beginning of each chapter where you will need specific items.

## here is another suggestion

Involve the parents at the start of a learning period. This can have some real advantages.

1. Parents will feel that they are part of their child's learning process if the objectives can be stated in a meaningful way.
2. Most parents are eager to help but many times do not know what to do. It is easier to enlist their aid to prevent problems than to have them work with their child after a problem arises.

3. If objectives are presented in advance, reporting progress will be much easier. In fact, parents will have evaluation techniques that they can use themselves.

Model letters will be presented in the Resource Section periodically throughout the guide.

You will of course want to adapt them according to your style and perhaps modify them so that the priorities of your school's curriculum become more obvious.

In the interests of prose style, we've referred to the learner as "he." You may want to have two letters—one for boys and one for girls. Talk over the letter idea with your supervisor and fellow teachers before you send the first one home. Be sure it is a practice you're willing to continue. Most parents will like the letters so much that they'll want an explanation if the letters stop coming.

## letter to parents

Dear Parents:

Over the next several months your youngster should develop real pride in his achievement in math. We will be reviewing both the addition and subtraction facts, but we won't be doing things in the same old way. The number line will be a new idea. If you hear your youngster talk about Polly's or Peter's pogo stick or about Foster's frog, you'll know that some storybook characters are helping everyone get acquainted with both addition and subtraction shown on a number line.

We'll have a lot of problem solving too. It will be a real challenge to figure out how many different pairs of numbers can be added to make 10, or 11, or even 18.

These activities and many more will help your child make certain that he knows every one of the addition and subtraction facts.

You can help. The number facts on flash cards may be old-fashioned but presenting them in this way is still a very effective way to practice. The number facts must be memorized just as does the alphabet. The alphabet is needed to use a phone book, an encyclopedia, or a dictionary. And the number facts are needed to do just about all computation. Can you imagine what your checkbook would look like if addition and subtraction weren't part of your skills?

Your child will come in contact with lots of word problems that reflect everyday situations at home. Please let your youngster help you solve problems. The key questions are "How many in all?" "How many more are needed?" "How many remain?"

If you buy something that costs less than a dollar, let your child count the change. It may be hard at first but it will give you a chance to see how skills are developing.

In the future we will be working with numbers greater than 100. Learning about large numbers isn't as easy as it may sound, so please be patient.

We'll keep you informed about our math study this year. We know you share our goal of making math interesting and rewarding.

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# OBJECTIVES

Content objectives have been a part of instructional programs for years.

Recently there has been an increased emphasis on being more specific about these objectives. Performance, instructional, educational, and behavioral objectives can be defined quite differently from one another, but there is little agreement as to a single definition for each kind. There is agreement about the purpose of objectives, however. This program was built upon learning objectives. Each objective clearly states what pupil behavior is to be observed, the conditions under which the pupil is to perform, and the criteria for acceptable performance.

These learning objectives by definition are limited to observable behavior; therefore they are automatically limited to the cognitive domain. This is a severe limitation, for the field-test information reveals that the affective domain also has been penetrated.

Increased pupil awareness of mathematics in the everyday world has been reported again and again. A greater pupil involvement in things relating to mathematics has been shown in the complete range of abilities. Attitudes have been changed. But writing objectives for the affective domain is a new endeavor, and frankly we have not yet mastered the art. The following, therefore, are learning objectives in the cognitive domain. Each objective states the performance expected at the completion of the second-level materials.

## whole-number concepts

1. Given a set of from 0 to 999 members, the learner can count, say, and write the number of members in the set.
2. Given any two numbers from 0 to 999, the learner can compare the numbers by saying "more than," "less than," or "equal to" or by writing the symbols  $>$ ,  $<$ , or  $=$ .
3. Given any two numbers less than 999, the learner can write or say the numbers in between.

## whole-number notation

1. Given any one of the numerals 0, 1, 2, 3, . . . , 999, the learner can read it aloud; given any of these numerals orally, the learner can write it.
2. Given the number of hundreds, tens, and ones, the learner can write the corresponding numeral.

## whole-number operations

1. Given any two 2-digit numbers, the learner can find their sum.
2. Given a subtraction number fact written in horizontal or vertical form, the learner can say and write the difference.
3. Given any two numbers from 0 to 99, the learner can find their difference.
4. Given any two numbers with a sum less than 100, the learner can show that the order in which the two numbers are added does not change their sum.
5. Given any three 2-digit numbers with a sum less than or equal to 100, the learner can find their sum.

6. Given any three numbers from 0 to 99 with a sum less than or equal to 100, the learner can show that the way the addends are grouped does not affect their sum.

## fractional-number concepts

Given a region or a number strip divided into halves, fourths, or eighths, the learner can say and write the fraction associated with marked parts.

## fractional-number notation

Given any of the fractions  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{2}{4}$ ,  $\frac{3}{4}$ ,  $\frac{1}{8}$ , the learner can read it aloud; given any of these fractions orally, the learner can write it.

## geometry concepts

Given objects such as boxes, cans, balls, and blocks, the learner can identify rectangular prisms, triangular prisms, cubes, and cylinders by sorting.

## measurement

1. Given a standard unit of metric measure (centimetre) or customary measure (inch), the learner can find the number of whole units in the length of an object.
2. Given a clockface with hands showing the hour or half-hour, the learner can name the time.
3. Given a calendar and a specified date, the learner can locate that date on the calendar.
4. Given a dollar bill and a set of pennies, nickels, dimes, and quarters (not to exceed the value of one dollar), the learner can tell the value of the money.



# 1 ADDITION AND SUBTRACTION FACTS

**before this chapter the learner has —**

1. Counted, said, written, and ordered the numbers 0 through 99
2. Mastered saying and writing the sum for an addition fact
3. Practiced saying and writing the difference for a subtraction fact
4. Compared two numbers less than 100 by saying “greater than,” “less than,” or “equal to”

**in chapter 1 the learner is —**

1. Using the number line to show addition and subtraction
2. Reviewing the addition facts
3. Mastering saying and writing the difference for a subtraction fact
4. Solving one-step word problems, using an addition or subtraction fact
5. Examining the addition table and a subtraction table for patterns
6. Adding and subtracting cents

**in later chapters the learner will —**

1. Find the sum or difference for any two 2-digit numbers
2. Tell the value of a set of coins (not to exceed a dollar)
3. Solve one-step word problems involving 2-digit numbers and either addition or subtraction

# Notes & Things

The study of the addition operation was comprehensive in level 1. In fact, each child's goal was the mastery of every one of the addition facts. To the child the word *mastery* simply meant "I know the answer every time." But since children—together with adults—do forget, this chapter is a review of the concept and of all the number facts too.

In level 1, addition was viewed as the action of bringing numbers of objects together. The sum was the answer to the question "How many in all?" The ten-tray, fashioned from an egg carton, was the most frequently used manipulative device. The number-line model was saved, to be introduced in this level's review experiences.

You will see that the chapter makes very few assumptions of prior learning. You will be able to determine for yourself how much each child remembers. The first pages are organized so that you can quickly see the child's ability to write each numeral, how the child responds to oral directions, and which individuals actually remember the addition facts. Regular Progress Checks will help you identify the youngsters who are ready to move quickly and those who will need more time for extra practice.

Although the youngsters have not had a mastery objective for the subtraction facts in the past, now they do. Maybe some of the children will surprise you by already

knowing all the subtraction facts. That would be good! Have those youngsters help you as peer tutors. Don't worry if not everyone masters all the facts by the end of this chapter. There will be many more practice sessions in later chapters.

In this chapter there are lots of opportunities for the children to think as well as to do. You'll enjoy the word problems, and you will find some good problem situations that will let everyone know that arithmetic skills really are useful.

## words

Concept-development words and phrases introduced in this chapter are listed in the order in which they are used orally. Those words that also appear on pupil pages are marked with an \*.

number line\*  
units  
names\*

## things

spirit master of number line  
crayons  
colored wood cubes  
2 boxes  
counters of various kinds  
numeral cards 0 through 18  
symbol cards for + and -  
10 large numeral cards

brushes and jars of paint  
yarn and string  
pieces of chalk  
scissors  
actual coins  
actual objects on page 45  
addition and subtraction fact flash cards

For the extra activities you will want to have these things available:

old magazines  
shoelaces  
linoleum tiles  
sheets of clear plastic or laminating film  
washable crayons  
coloring books  
colored plastic self-adhesive tape  
masking tape  
tagboard  
 $\frac{1}{4}$ -inch dowel rods  
adding-machine tape  
tongue depressors  
paper punch  
poster board  
beanbags  
24-bottle wood case  
egg timer or stopwatch  
paper fasteners  
paper plates  
snap clothespins  
coat hanger  
oaktag



name \_\_\_\_\_



**goal** Survey—knowledge of number and other math concepts

**memo** Use pages 1 and 2 as an informal survey of your pupils' math knowledge. You'll be able to identify those youngsters who are unsure and will need special attention.

**page 1** The questions you can ask are endless. Concepts that can be surveyed include counting, numbers, position, geometric shapes, size, and time. Use questions such as the following: *How many children in the picture? Are there as many boys as girls? Is there a chair for each child? Which child is the tallest? shortest? Are the chairs all the same size? What's on top of the third chair? Draw a ball under the fourth chair. What time is shown on the clock? Can you find something that has a curved surface? a flat surface? Find something that is square. Mark the circular things you see. Is there a triangle? Which children are facing left? What is to the right of the clock?* Continue as long as there is interest.

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PURPOSE: Informal survey



**things** for each pupil: sheet of newsprint or manila paper, crayons

Pupils fold their papers into 6 sections. With papers unfolded, pupils write a number less than 10 at the top of each section and the numeral word at the bottom. In each section they draw as many objects as the number.



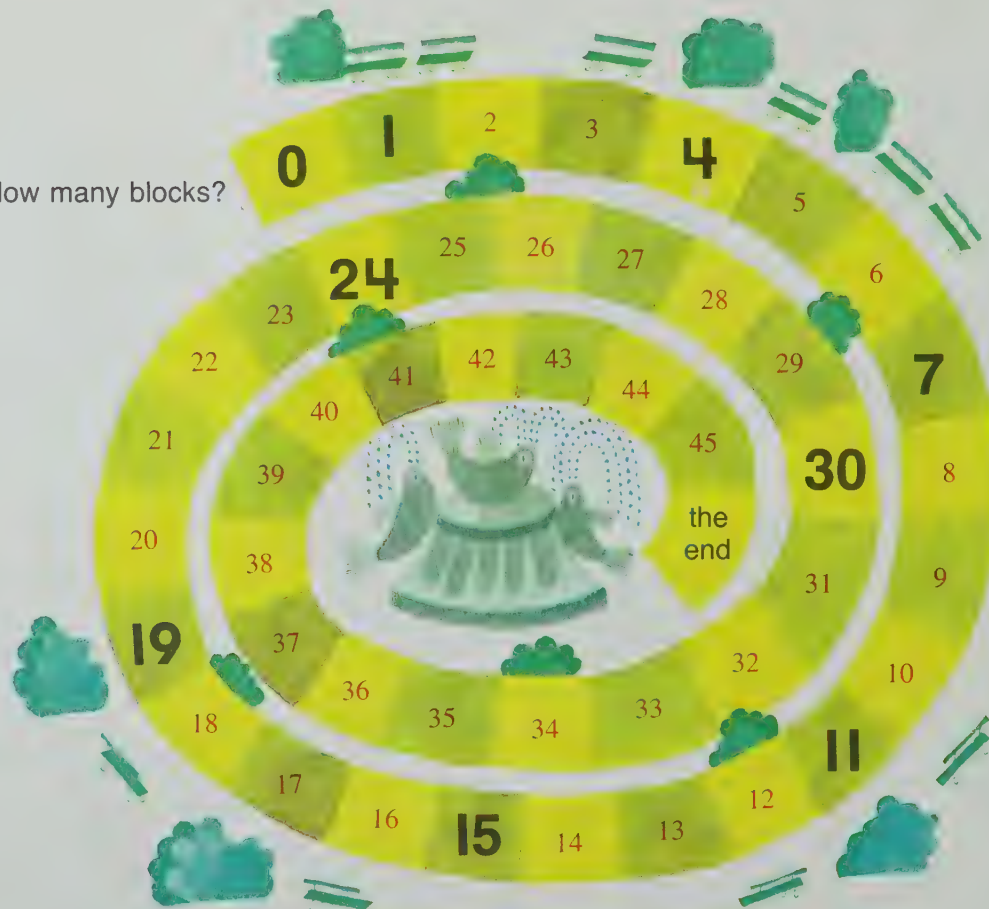
See activity 1, page 50a.

**goal** Survey—ability to count in order and to write numerals

**page 2** *My, that's a long walk to the fountain. How many blocks do you suppose it is? Is there anything missing? Get everyone started writing in the missing numerals. Show me your very best writing. Watch for anyone who needs extra help in counting or in writing. Separate penmanship practice from math, please.*

2

How many blocks?



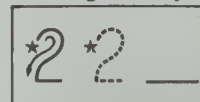
PURPOSE: Counting and writing numerals.



**things** cardboard, plastic sheet, washable crayons

Prepare guide sheets as shown. Use cardboard to provide a firm backing for writing. Cover the guide with a sheet of plastic (or laminate). The child traces over the numeral with a washable crayon. This writing can be wiped

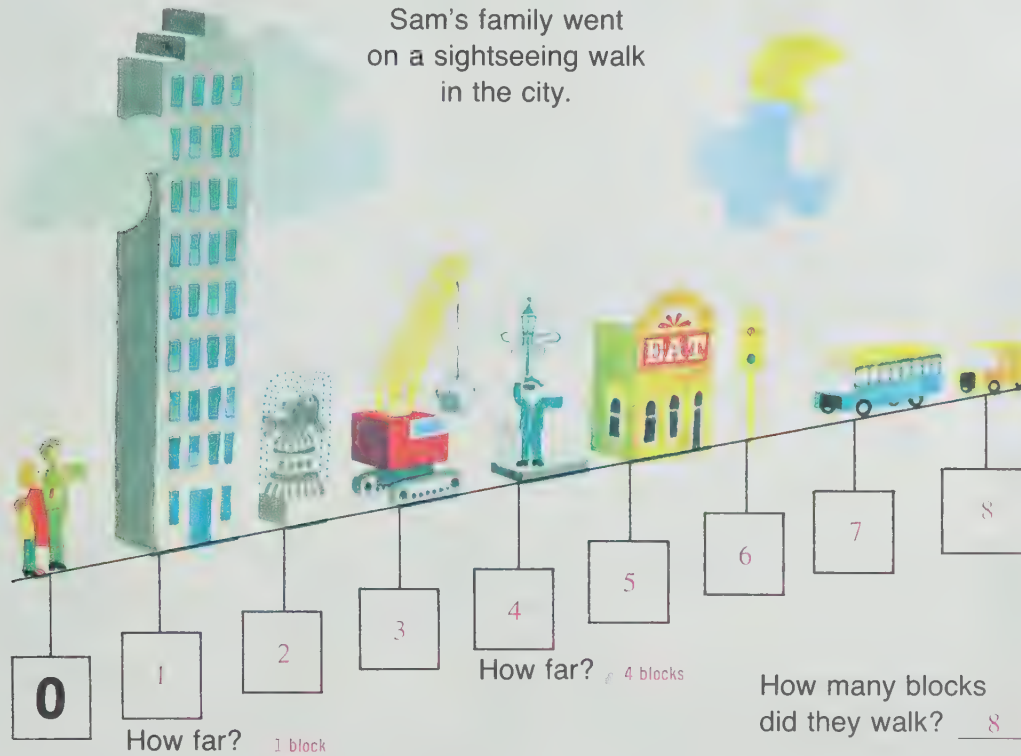
off with tissue or a cloth. A pupil should practice only those numerals with which he is having difficulty.





name \_\_\_\_\_

Sam's family went  
on a sightseeing walk  
in the city.



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PURPOSE: Introduction to the number line.

**goal** Introduction to the number line

**memo** Level 1 of this program **does not** introduce the number line. This will be the pupils' first experience with this concept.

**warm-up** Begin with a review of counting in order. Ask what it means to walk **1 block**. (The youngsters may not think city blocks.) Draw a sketch of streets on the board. Use familiar street names.



Show us one block on this map. another block. Do not talk about going around a block at this time.

**page 3** From one answer box to another answer box is one block on this map. How many blocks did Sam's family walk to see the tall building? Write how many blocks they walked in the box below the building. They walked one more block to see the fountain. How many blocks have they walked so far? (2) Write how many blocks in the box below the fountain. Continue until the last box to the right is filled. Then ask what number is in the box where the family began their walk. Why is zero written in this box? (They hadn't walked any blocks yet.)

Use the completed map to answer questions such as *How many blocks did they walk before coming to a traffic light? Sam's sister wanted to meet a policeman. How many blocks did they walk to find one?*

See activity 2, page 50a.



Have the children work as a group to make a map of the neighborhood where the school is located. If children ride the bus, they may not know street names. Mark the homes of any children who live near the school, stores, shops, and of course, the school.

**goal** Introduction to showing distances on the number line

**things** chalkboard eraser

**warm-up** Draw a star on the board.  
Direct a child to put one end of an eraser next to the star and mark the length of the eraser. *How many eraser lengths have you shown?* Write 1 below the mark. Continue. Move the eraser. Mark the second length. Write 2 below that mark. Keep on until 10 lengths are recorded.

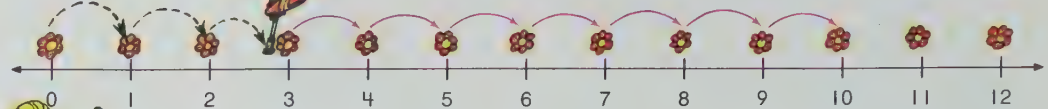
Go back to the star. *How many erasers were marked here?* (Zero) Record zero below the star. Connect the marks with a line. *A line like this is called a NUMBER LINE.* Why? Go directly to the pupil page.

**page 4** Look out for reading problems!  
You tell the story. *Where do you suppose Polly started on her Pogo stick? How far did Polly go on her first jump? The dotted curved line and arrow show how we keep track of jumps. Show Polly's first jump by tracing the line to 1. How many jumps has Polly taken? Why is the numeral 1 under the mark? Get tracings of the first 3 jumps. Ask why the numerals are below each jump. The story said Polly made 10 jumps. Show each jump.*

4



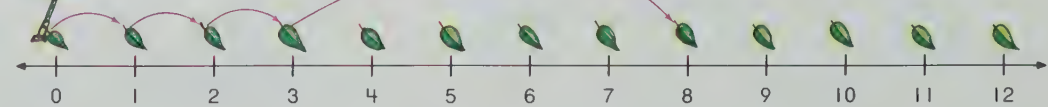
Polly loved her pogo stick.  
She made 10 jumps of 1 without stopping.  
Show her jumps on the number line.



Polly made giant jumps too.  
She could make one giant jump and land on 4.  
Show this 4-jump on the number line.



Peter tried the pogo stick.  
He made 3 jumps of 1. Show the jumps.  
Then Peter made one giant jump of 5.  
Show it on the same line. ~~How far did Peter jump in all?~~ 8



PURPOSE: Practice with the number line.



See activity 3, page 50b.



name \_\_\_\_\_



Most frogs hop short hops and long hops.  
Fred's frog hopped the same distance every time.  
Show 10 hops on the number line.



Frank's frog hopped the same distance with each hop too.  
Frank's frog could land on 10 with only 1 hop.  
Show the 10-hop on the number line.



Fran's frog hopped the same distance with each hop too.  
Fran's frog could land on 10 with only 2 hops.  
Show the hops on the number line.



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PURPOSE: Practice with the number line.

**goal** Practice in showing distances on the number line

**memo** Learning about the number line is hard for some children. Work together and go *nice and easy.*

**page 5** Notice that the **hops** are counted this time—not the jumps. The distances are not all of the same length either. Continue the approach used on page 4. The last problem is **hard**. It will indicate which children know how to use a number line to show a quantity. Not everyone will solve this problem.

After completing the page, review what these lines are called. *Do you notice anything special about the lines?* Emphasize these points:

- The distance from 0 to 1, from 1 to 2, and so on, is always the same.
- The numbers are in order.
- All the lines begin with zero.



**things** colored plastic self-adhesive tape, felt pen

A washable number line can be made on the chalkboard with plastic self-adhesive tape. Show the units with a felt pen and write the

numerals below the line with chalk. Make the number line at a height the children can reach.

**goal** Readiness to show addition on the number line

**warm-up** Draw a line on the board. *What must we put on this line to make it a number line?* Let the children complete it by putting on the hash marks, the numerals, and the arrowheads. Then let the children make up stories and record the jumps involved.

**page 6** Read and talk about Foster's frog. Discuss some of the possible jumps and record some of them together. Most of the page should be done independently.

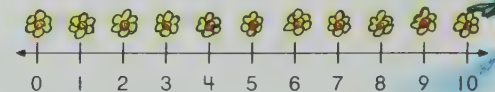
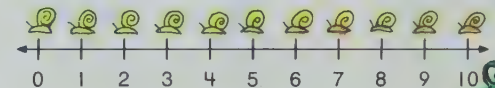
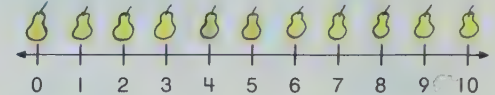
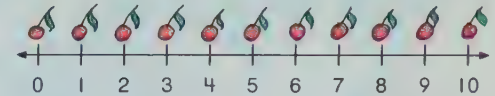
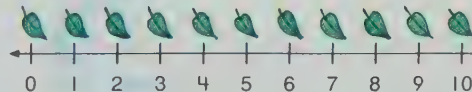
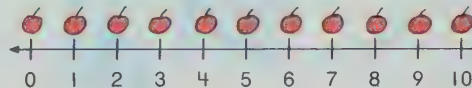
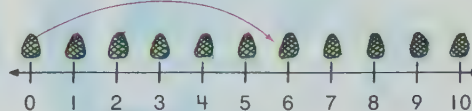
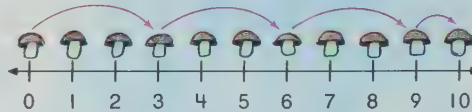
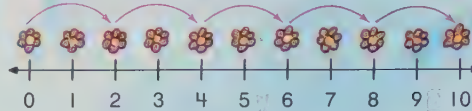
Take time to talk about the completed page. *How long is a jump from 0 to 6? (6 UNITS)*  
*How long is a jump from 6 to 10? (4 units)*  
Careful—that last one can be a difficult question for children to answer.

6

Foster's  jumped any old distance.

Show some of the ways Foster's  could jump.

Anything goes! Some possible jumps are:



PURPOSE: Practice with the number line.



**things** adding-machine tape or strips of oaktag, felt pen, laminating film or clear self-adhesive paper

Use the adding-machine tape or strips of oaktag to make individual number lines that will fit on the pupils' desks. Laminate or cover

these with clear self-adhesive paper. The youngsters can use their animal puppets (activity 3, page 50b.) or washable crayons to show jumps.



name \_\_\_\_\_



Which is more?

5 and 3 or 5 and 4      4 and 5 or 4 and 3  
 5 and 3 or 5 and 2      4 and 5 or 4 and 6  
 5 and 3 or 6 and 3      4 and 5 or 4 and 4  
 5 and 3 or 4 and 5      4 and 5 or 6 and 0



Write the different ways you can get to 13, making only 2 jumps.

\* Jump 1 and 12 more.      Jump 5 and 8 more.  
 Jump 2 and 11 more.      Jump 6 and 7 more.  
 Jump 3 and 10 more.      Jump 7 and 6 more.  
 Jump 4 and 9 more.      Jump 8 and 5 more.

\*Order of answers may vary

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PURPOSE: Practice with the number line.

**goal** Readiness to show addition on the number line

**things** spirit master of number lines  
crayons of 2 colors

**page 7** A spirit master of number lines will prove helpful with this page. (See page 128c.) The children can then mark the two sets of jumps with different colors in order to compare which set is more. Or they can mark the first set of jumps above the line and the second set of jumps below the line. Watch out for trouble spots such as showing zero. Make sure the children are counting the distance **between** marks as one unit.



**things** animal puppets (activity 3, page 50b)

Pair pupils. Have each pair prepare and present a story to the group, using their puppets. Emphasize the direction of movement.

**goal** Ordering numbers on the number line

**memo** This page will help you identify pupils who have grasped the idea that numbers are in order on the number line.

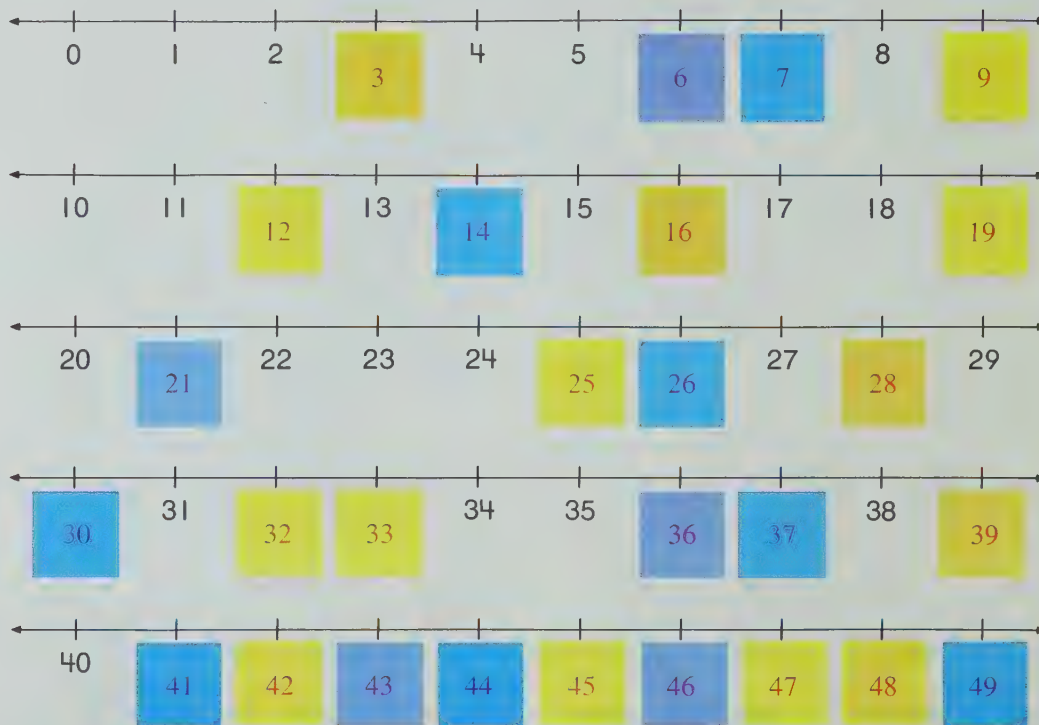
**page 8** Ask questions to see if the children can decide what to do with this page. Try out some of the ideas before you all agree what should be done. Then the page can be completed independently.

Take time to share ideas. Examine the page for patterns. For example:

- The last number shown on each line ends with the digit 9.
- The next number down any column is always ten more than the number above it.
- Any number to the right is one more.
- A number to the left is one less.

8

Fill in the boxes.



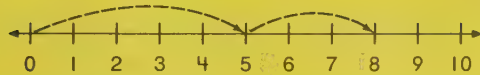
What number comes after 49? 50

PURPOSE: Filling in the numbers on a number line.

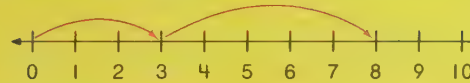


name \_\_\_\_\_

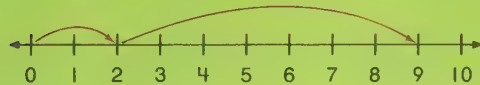
Show 5 and 3 more.



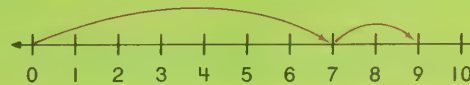
Show 3 and 5 more.



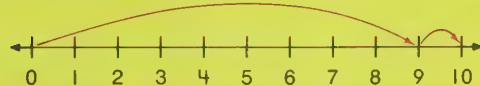
Show 2 and 7 more.



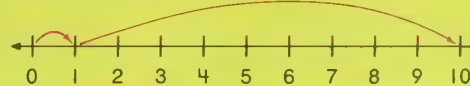
Show 7 and 2 more.



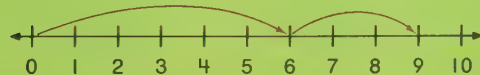
Show 9 and 1 more.



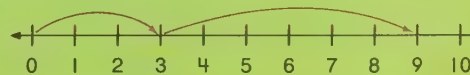
Show 1 and 9 more.



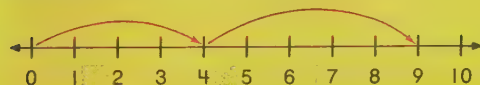
Show 6 + 3.



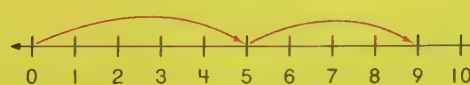
Show 3 + 6.



Show 4 + 5.



Show 5 + 4.



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PURPOSE: Showing addition on the number line.

**goal** Introduction to addition on the number line

**memo** We're moving to the abstract! This is the first time the pupils are showing distances on the number line without the help of things such as jumping frogs. The word **UNIT** needs to be introduced now; so be prepared.

**warm-up** Have the children draw several number lines on the board. Ask a child to show a jump of 1 on the line. *This jump is 1 unit long. Who can show a jump that is 2 units long?*

Start on another number line. *How many units from 2 to 4? Prove it. How many units from 4 to 7? Prove it. Continue until the children show that they understand counting units on the number line.*

**page 9** This page demonstrates the commutative property of addition. Work the page row by row. There is no need to discuss this property, however, unless the children notice it.

Complete the first row together. *How many should we show first? How many more? How many in all?* Repeat for the number line on the right. Continue to work with the youngsters until they feel confident. Then let them complete the page independently. Before leaving the page ask, *What does the symbol + mean? What do these number lines help us with?* (Addition)



Provide additional practice with questions like these:

- What number comes **between** 4 and 6?
- What number comes **before** 23?
- What number comes **after** 39?
- Does 36 come before 26? Where does it come?

**goal** Practice in showing addition on the number line

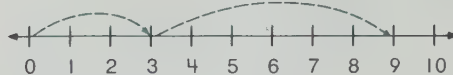
**memo.** Notice that this is the first page where the learner is to complete an addition sentence. This is probably old stuff to the youngsters, but if there is any hesitation, take time out to review the meaning of the addition symbol **and** the equal symbol and how to read and write the math sentence.

**page 10** Pupils who are working with confidence should proceed independently while you work with those who need more help.

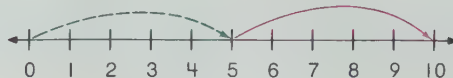
10

Show the addition.

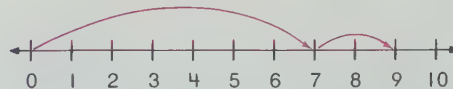
Show 3 and 6 more.



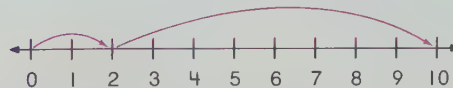
$$3 + 6 = \underline{9}$$



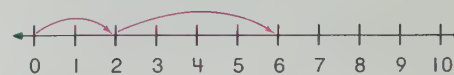
$$5 + 5 = \underline{10}$$



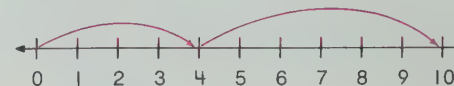
$$7 + 2 = \underline{9}$$



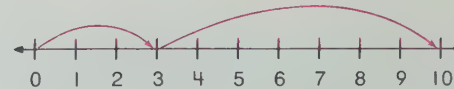
$$2 + 8 = \underline{10}$$



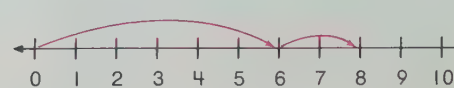
$$2 + 4 = \underline{6}$$



$$4 + 6 = \underline{10}$$



$$3 + 7 = \underline{10}$$



$$6 + 2 = \underline{8}$$

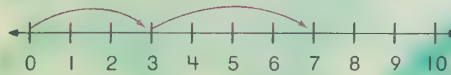
PURPOSE: Showing addition on the number line.



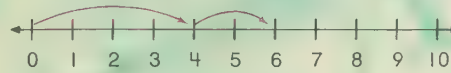
name \_\_\_\_\_

**Use the number line to find the answers.**

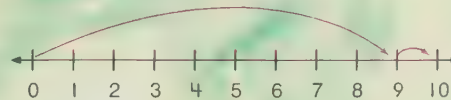
ran 3 blocks.  
Then he ran 4 blocks more.  
How far in all?

7

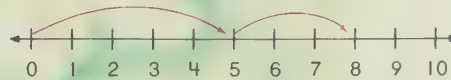
walked 4 blocks.  
Then she walked 2 more.  
How far in all?

6

rode 9 blocks.  
Then he rode 1 more.  
How far in all?

10

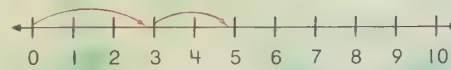
went 5 blocks.  
Then she went 3 more.  
How far in all?

8**Your turn. You tell part of the story.**

went 3 blocks. Possible answers are given.

Then she went 2 more.

How far in all? 5



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PURPOSE: Working with number lines in story situations.

**goal** Using the number line to help solve word problems

**page 11** Have fun making up names for the cartoon characters. You will need a name in order to have a subject for each story's first sentence. Don't let reading stand in the way of success with math. Provide the help that is necessary. **But** the answers should be found independently.



Form small groups. Someone is selected to be first. This person says a number not greater than 10. Everyone tries to write as many addition sentences as possible for which that number is the answer. Results are compared to find who wrote the most

sentences. Others add to their list any sentences they missed. The next person says a new number and the activity continues.

**goal** Review of addition facts with sums through 10

**memo** Use whatever manipulatives you have available to review the addition facts with sums through 10. The writing of addition sentences should come as a result of manipulative experiences.

**things** wood cubes of 2 colors  
2 boxes  
counters of 2 kinds

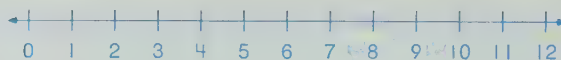
**warm-up** Separate the cubes into two boxes by color, nine cubes to each box. Have a child pick cubes from one box, stack them, and tell how many. Have another child count from that first number and select enough cubes from the second box to make 10. Have the children describe the stacks of blocks and record the addition sentence. Youngsters who are not working with confidence should repeat this action with their own counters. Continue to review the facts with a sum of 10.

**page 12** The youngsters may use whatever aid is necessary to help them complete the page independently. Go over completed addition sentences together.

If someone doesn't see the visual pattern of the beads, hope that the pattern of numbers in the sentence is obvious. Patterns will be used a lot. This is not the way to explain to a child what a pattern is. But the notion of patterns will bring satisfaction as children discover them by themselves.

12

**Add**



$7 + 3 = 10$

$1 + 1 = 2$

$8 + 2 = 10$

$4 + 4 = 8$

$2 + 2 = 4$

$8 + 0 = 8$

$5 + 9 = 14$

$0 + 2 = 2$

$5 + 1 = 6$

$0 + 0 = 0$

$3 + 6 = 9$

$7 + 1 = 8$

$2 + 6 = 8$

$1 + 8 = 9$

$3 + 4 = 7$

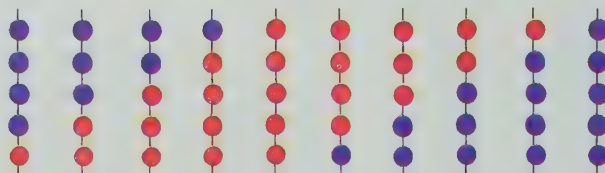
$6 + 4 = 10$

$4 + 2 = 6$

$10 + 0 = 10$

$5 + 2 = 7$

$6 + 1 = 7$



Write a sentence to describe each stack of beads.

$3 + 2 = 5 \text{ or } 2 + 3 = 5 \quad 4 + 1 = 5 \text{ or } 1 + 4 = 5 \quad 2 + 3 = 5 \text{ or } 3 + 2 = 5$

$1 + 4 = 5 \text{ or } 4 + 1 = 5 \quad 0 + 5 = 5 \text{ or } 5 + 0 = 5$

PURPOSE: Addition practice.



**things** 2 wood cubes, counters to identify each player, large sheet of paper, felt pen

Label the faces of the cubes with the numerals 0 through 5. Write large numerals 0 through 10 on the paper to form the answer scoreboard.

In turn the player rolls the cubes, adds the numbers that land faceup, and places a counter on the scoreboard numeral that is the answer. The first player with 3 counters on the **same** numeral wins.

name \_\_\_\_\_

ADD



$$9 + 1 = 10 \quad 2 + 7 = 9 \quad 8 + 1 = 9 \quad 2 + 5 = 7$$

$$5 + 5 = 10 \quad 3 + 3 = 6 \quad 1 + 5 = 6 \quad 0 + 8 = 8$$

$$6 + 4 = 10 \quad 8 + 2 = 10 \quad 9 + 2 = 11 \quad 2 + 4 = 6$$

$$3 + 7 = 10 \quad 4 + 0 = 4 \quad 3 + 1 = 4 \quad 2 + 1 = 3$$

$$4 + 3 = 7 \quad 6 + 3 = 9 \quad 6 + 2 = 8 \quad 1 + 0 = 1$$

Ring the pairs of numbers that added to 10.

Write other pairs of numbers that you can add to get 10.

1 + 9, 4 + 6, 2 + 8, 7 + 3, 10 + 0

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PURPOSE: Progress check—addition.

**goal** Progress Check—addition with sums through 10**things** numeral cards for 0 through 10

**warm-up** Show me a pair of numbers that we can add together to make 8. Can anyone show me another pair that we can add to make 8? any others? Be generous with your praise. What pairs can be added to show 9? Continue as long as the children enjoy the game. Then they certainly should be ready for the page.

**page 13** Since this is a Progress Check, the pupils should work independently. If you find a child having difficulty, encourage him to use counters or the number line. He should not go on in the book until he can handle the addition facts with sums through 10 with confidence.



See activity 4, page 50b.



See activity 5, page 50b.

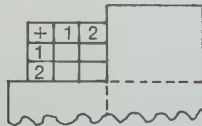


**goal** Introduction to the addition table

**things** 1 sheet of paper for each pupil

**page 14** Watch for pupils who have never seen such a table. Have each child take his sheet of paper and cover everything except the first row that goes across from left to right. Focus attention on the numerals at the top of the table. *We are going to add zero to each number in this row. Zero plus zero is how many? Good! Write zero in the first empty box. Zero plus 1 is how many? Write 1 in the next box. What is zero plus 2? Write it. Finish the row by yourself.* Continue until the youngsters appear confident to continue on their own.

After checking, have everyone fold his paper in half and in half again to form four same-size parts. *Open your paper and tear out one of the four parts. Put this paper over the table so the + symbol is in one corner, 2 in another corner, 2 in the third corner. 2 plus 2 is how many?*

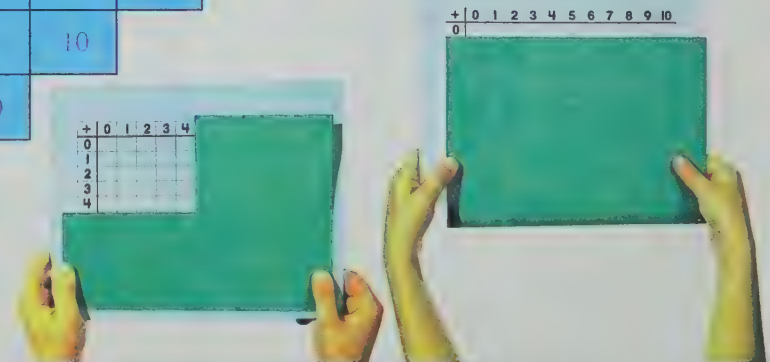


Have the children slide the mask to show  $3 + 3$ , then  $3 + 4$ , then  $2 + 5$ , and so on. This can go on for a long time. You might want to try showing  $2 + 3$  in two different ways. Insight into commutativity is almost guaranteed even though you don't talk about it. Save the masks. They'll be used again on page 25.

Complete the table.

+	0	1	2	3	4	5	6	7	8	9	10
0	0	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10	
2	2	3	4	5	6	7	8	9	10		
3	3	4	5	6	7	8	9	10			
4	4	5	6	7	8	9	10				
5	5	6	7	8	9	10					
6	6	7	8	9	10						
7	7	8	9	10							
8	8	9	10								
9	9	10									
10	10										

PURPOSE: Addition practice.



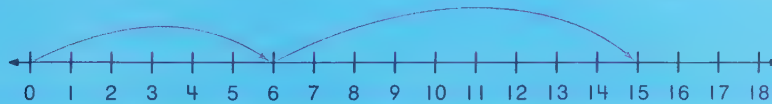
name \_\_\_\_\_

Show the addition on the number line. Complete the sentence.

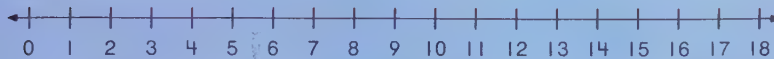
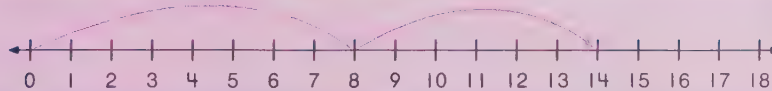
$9 + 4 = \underline{13}$



$6 + 9 = \underline{15}$



$8 + 6 = \underline{14}$



Are enough numbers marked on the last line to show...

$9 + 7? \underline{\text{Yes}}$

$10 + 8? \underline{\text{Yes}}$

$10 + 7? \underline{\text{Yes}}$

$9 + 9? \underline{\text{Yes}}$

$9 + 8? \underline{\text{Yes}}$

$10 + 9? \underline{\text{No}}$

**lesson** Pages 15, 16, 17**goal** Showing sums greater than 10 on the number line**memo** Pages 15, 16, and 17 review addition combinations with sums from 10 through 18. There are more problems on these pages than most youngsters can handle in one day. Some pupils will need all the practice, however—maybe more. Take all the time necessary to do it.**things** spirit master of number lines**warm-up** Practice showing sums no greater than 18 on individual number lines. Say a pair of numbers. Have the children show the distances and find the sum on the number line. Continue until your pupils work with confidence.**page 15** After the warm-up the youngsters should be able to work independently. When checking, ask the children to prove their answers for the last problem by using the number line. Talk about **why** the sentences can or cannot be shown.

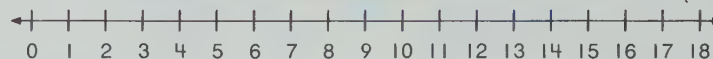
**goal** Review of addition with sums from 10 through 18

**page 16** Encourage pupils who are insecure to use counters or the number line as they complete the sentences independently. (Even fingers are O.K. Now is not the time for any child to feel insecure.)

Begin the last question on the page as a chalkboard activity. Turn it into a game. *Who can find one more pair?* You may get a delightful argument that  $7 + 5 = 12$  is the same as  $5 + 7 = 12$ . If it happens, encourage further investigation but leave the argument unresolved. *We'll have to keep on checking to see if that happens with other addition facts.* Then go back to the notion of commutativity (without naming it) as often as is appropriate.

16

**ADD**



$1 + 9 = \underline{10}$	$8 + 8 = \underline{16}$	$3 + 8 = \underline{11}$	$8 + 7 = \underline{15}$
$5 + 7 = \underline{12}$	$5 + 6 = \underline{11}$	$4 + 9 = \underline{13}$	$9 + 5 = \underline{14}$
$6 + 7 = \underline{13}$	$9 + 3 = \underline{12}$	$9 + 6 = \underline{15}$	$7 + 5 = \underline{12}$
$3 + 9 = \underline{12}$	$8 + 3 = \underline{11}$	$6 + 8 = \underline{14}$	$9 + 2 = \underline{11}$
$5 + 9 = \underline{14}$	$4 + 6 = \underline{10}$	$7 + 6 = \underline{13}$	$10 + 0 = \underline{10}$

Write the pairs of numbers that you can add to get 12.

$4 + 8$   $5 + 7$   $6 + 6$   $3 + 9$   $8 + 4$   $7 + 5$   $9 + 3$

Also accept:  $0 + 12$   $1 + 11$   $10 + 2$   
 $12 + 0$   $11 + 1$   $2 + 10$

PURPOSE: Addition practice.



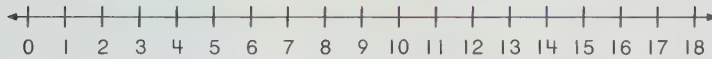
**things** strips of construction paper

The children can make a bulletin-board display that also serves as a study aid by writing all the pairs of numbers that have a sum of 12 on a strip of construction paper.

Sums of 13, 14, 15, 16, 17, and 18 are found on the following pages. Use a different colored-paper to prepare a list for each of these. As the display grows, patterns will be seen.



name \_\_\_\_\_


 ADD


$5 + 8 = \underline{13}$      $8 + 5 = \underline{13}$      $8 + 4 = \underline{12}$      $6 + 5 = \underline{11}$

$7 + 8 = \underline{15}$      $6 + 6 = \underline{12}$      $4 + 8 = \underline{12}$      $8 + 9 = \underline{17}$

$2 + 9 = \underline{11}$      $7 + 9 = \underline{16}$      $9 + 9 = \underline{18}$      $9 + 8 = \underline{17}$

$7 + 7 = \underline{14}$      $9 + 7 = \underline{16}$      $7 + 4 = \underline{11}$      $6 + 9 = \underline{15}$

Write the pairs of numbers that you can add to get 13.

$9 + 4$   $6 + 7$   $8 + 5$   $4 + 9$   $7 + 6$   $5 + 8$

Also accept:  $13 + 0$   $12 + 1$   $10 + 3$   
 $0 + 13$   $1 + 12$   $3 + 10$

**goal** Practice in adding with sums from 10 through 18

**page 17** Consider assigning only two columns to half of the group and the other two columns to the other half. *Who had the hardest problems to do?* As the answers are corrected, occasionally ask a child to prove an answer.

**goal** Progress Check—addition with sums through 18

**memo** Time to identify pupils who need more help and those who are capable of moving faster.

**page 18** The problems have been organized to help you meet individual needs. Assign two appropriate columns for each child.

Sums through 10	Sums of 11 through 13	Sums of 13 through 18
--------------------	--------------------------	--------------------------

Look for the particular difficulty a child is having and provide the specific practice needed.

18

Add

$$5 + 0 = \underline{5}$$

$$3 + 4 = \underline{7}$$

$$2 + 3 = \underline{5}$$

$$4 + 4 = \underline{8}$$

$$5 + 3 = \underline{8}$$

$$0 + 0 = \underline{0}$$

$$6 + 4 = \underline{10}$$

$$4 + 2 = \underline{6}$$

$$7 + 3 = \underline{10}$$

$$4 + 8 = \underline{12}$$

$$9 + 3 = \underline{12}$$

$$6 + 5 = \underline{11}$$

$$7 + 4 = \underline{11}$$

$$2 + 9 = \underline{11}$$

$$8 + 3 = \underline{11}$$

$$9 + 4 = \underline{13}$$

$$3 + 9 = \underline{12}$$

$$5 + 6 = \underline{11}$$

$$9 + 9 = \underline{18}$$

$$7 + 8 = \underline{15}$$

$$9 + 6 = \underline{15}$$

$$8 + 8 = \underline{16}$$

$$6 + 8 = \underline{14}$$

$$7 + 9 = \underline{16}$$

$$7 + 7 = \underline{14}$$

$$8 + 9 = \underline{17}$$

$$6 + 7 = \underline{13}$$

PURPOSE: Progress check—addition.



See activity 6, page 50b.



See activity 7, page 50b.

name \_\_\_\_\_



Sue had 2.  
She found 7 more.  
How many in all? 9

Dee lost 3.  
She lost 4 more.  
How many were lost? 7

Jon bought 9.  
He got 5 more.  
How many in all? 14

7 flew away.  
5 more left.  
How many went? 12

5 were in his right pocket.  
8 were in his left pocket.  
How many in the pockets? 13

Ted ate 6.  
He ate 7 more.  
How many eaten? 13

Jim caught 7.  
He caught 3 more.  
How many caught? 10

I made 8.  
I made 7 more.  
How many made? 15

6 fell down.  
8 more fell down.  
How many down? 14

9 broke.  
6 more broke.  
How many broke? 15

**goal** Application of addition to solve word problems

**memo** The way the word problems are presented suggests the vertical form for addition. There is a reason. The vertical form is used on page 20.

**page 19** Help with the reading if necessary as you work these problems together. Encourage your pupils to use their imaginations by asking *How many what?* for each story. Some wild stories can result.





**goal** Practice in adding with sums through 18

**memo** Nearly all the children should have stopped using counters to find the sum for an addition fact. Those that still need an aid need more practice. Maybe this is the time to enlist help from home.

**things** for each pupil:  
numeral cards for 0 through 10  
+ and - symbol cards (See page 128e.)

**warm-up** The children have been working with pairs of numbers whose sum is a specific number. Introduce NAMES for a number by discussing the many names a person might have. Susan Jones may be called Sue, Susie, Suz, Sis, and so on.

Write the numeral **10** on the board. Let the children figure out how many names 10 has. Leave plenty of room for thinking and give no hints—yet! Hope that a pupil will suggest  $5 + 5$  or  $6 + 4$ . Because of the plus sign, these are addition names. Do not encourage subtraction names now. Try naming a few more numbers through 18. Let the youngsters use their numeral and symbol cards for a few examples.

**page 21** The facts on this page are mixed in level of difficulty. Use the page to help you identify pupils who have not yet mastered the facts. Have each child ring the problem he thinks is the hardest.

name \_\_\_\_\_

# ADD

$\begin{array}{r} 9 \\ + 6 \\ \hline 15 \end{array}$	$\begin{array}{r} 5 \\ + 4 \\ \hline 9 \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$	$\begin{array}{r} 6 \\ + 8 \\ \hline 14 \end{array}$	$\begin{array}{r} 2 \\ + 4 \\ \hline 6 \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline 10 \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline 8 \end{array}$	$\begin{array}{r} 8 \\ + 6 \\ \hline 14 \end{array}$
--	---	---	--	---	--	---	--

$\begin{array}{r} 2 \\ + 6 \\ \hline 8 \end{array}$	$\begin{array}{r} 3 \\ + 6 \\ \hline 9 \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline 13 \end{array}$	$\begin{array}{r} 5 \\ + 9 \\ \hline 14 \end{array}$	$\begin{array}{r} 4 \\ + 5 \\ \hline 9 \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline 17 \end{array}$	$\begin{array}{r} 2 \\ + 7 \\ \hline 9 \end{array}$	$\begin{array}{r} 9 \\ + 7 \\ \hline 16 \end{array}$
---	---	--	--	---	--	---	--

Write names for 15.

14	+	1
13	+	2
12	+	3

15

11	+	4
10	+	5
9	+	6

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PURPOSE: Addition practice.

Also:  $8 + 7$ ,  $15 + 0$ ,  $6 + 9$ ,  $7 + 8$ ,  $0 + 15$ ,  
 $5 + 10$ ,  $4 + 11$ ,  $3 + 12$ ,  $2 + 13$ ,  $1 + 14$



**things** 2 wood cubes, counters to identify each player, large sheet of paper, felt pen

Label the faces of the cubes with the numerals 4 through 9. Write large numerals 8 through 18 on the paper to form the answer scoreboard.

In turn the player rolls the cubes, adds the numbers that land faceup, and places a counter on the scoreboard numeral that is the answer. The first player with 3 counters on the **same** numeral wins.

**goal** Practice in adding with sums of 11 through 18

**page 22** The facts on this page are considered to be the most difficult. Examine all errors. Identify the pupils who need more practice. Mastery is the objective.

Have each child do any three of the four rows on the left side of the page and ring the problem he thinks is the hardest in the row he hasn't completed. Everyone should find the mistakes in the problems on the right. As the page is being corrected, occasionally ask a child to prove an answer with counters or the number line.

22



$$\begin{array}{r} 4 \\ + 9 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 8 \\ + 8 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 9 \\ + 3 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 7 \\ + 8 \\ \hline 15 \end{array}$$

$$\begin{array}{r} 9 \\ + 9 \\ \hline 18 \end{array}$$

$$\begin{array}{r} 4 \\ + 7 \\ \hline 11 \end{array}$$

$$\begin{array}{r} 8 \\ + 8 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 4 \\ + 8 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 8 \\ + 3 \\ \hline 11 \end{array}$$

$$\begin{array}{r} 7 \\ + 5 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 9 \\ + 8 \\ \hline 17 \end{array}$$

$$\begin{array}{r} 6 \\ + 6 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 5 \\ + 7 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 7 \\ + 6 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 5 \\ + 8 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 9 \\ + 7 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 8 \\ + 4 \\ \hline 12 \end{array}$$

PURPOSE: Addition practice.

Somebody said these problems are correct. Do you agree? Correct the ones you think are wrong.

$$\begin{array}{r} 9 \\ + 7 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 14 \\ + 2 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 8 \\ + 7 \\ \hline 15 \end{array}$$

$$\begin{array}{r} 13 \\ + 3 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 8 \\ + 8 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 16 \\ + 0 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 10 \\ + 6 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 9 \\ + 8 \\ \hline 17 \end{array}$$

$$\begin{array}{r} 7 \\ + 9 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 15 \\ + 1 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 11 \\ + 5 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 12 \\ + 4 \\ \hline 16 \end{array}$$



**Contest:** Write as many names for 18 as you can think of. Pupils exchange completed papers and check to see whether the names are correct. The one with the most correct

names wins. Hurrah for the youngsters who include subtraction names and add more than two numbers. No hints, please!



name \_\_\_\_\_

<b>Add</b>	$\begin{array}{r} 7 \\ + 6 \\ \hline 13 \end{array}$	$\begin{array}{r} 5 \\ + 8 \\ \hline 13 \end{array}$	$\begin{array}{r} 8 \\ + 7 \\ \hline 15 \end{array}$	$\begin{array}{r} 4 \\ + 7 \\ \hline 11 \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline 14 \end{array}$	$\begin{array}{r} 4 \\ + 6 \\ \hline 10 \end{array}$	$\begin{array}{r} 8 \\ + 4 \\ \hline 12 \end{array}$
------------	--	--	--	--	--	--	--

$\begin{array}{r} 3 \\ + 9 \\ \hline 12 \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline 13 \end{array}$	$\begin{array}{r} 7 \\ + 9 \\ \hline 16 \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline 11 \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline 17 \end{array}$	$\begin{array}{r} 9 \\ + 3 \\ \hline 12 \end{array}$	$\begin{array}{r} 9 \\ + 9 \\ \hline 18 \end{array}$	$\begin{array}{r} 9 \\ + 7 \\ \hline 16 \end{array}$
--	--	--	--	--	--	--	--

## Complete each name for 17.

$15 + \underline{2} = \underline{17}$	$12 + \underline{5} = \underline{17}$	$9 + \underline{8} = \underline{17}$
---------------------------------------	---------------------------------------	--------------------------------------

$14 + \underline{3} = \underline{17}$	$11 + \underline{6} = \underline{17}$	$8 + \underline{9} = \underline{17}$
---------------------------------------	---------------------------------------	--------------------------------------

$13 + \underline{4} = \underline{17}$	$10 + \underline{7} = \underline{17}$	$7 + \underline{10} = \underline{17}$
---------------------------------------	---------------------------------------	---------------------------------------



See activity 8, page 50b.



See activity 9, page 50c.

**goal** Progress Check—addition with sums 10 through 18; finding a missing addend

**things** 10 large cards  
for each pupil:  
numeral cards for 10 through 18

**warm-up** Make two cards for each numeral 5 through 9 by writing a numeral on each large card. Place the cards facedown at random on a table. A child selects two cards and holds them up for everyone to see. Each pupil holds up the numeral card that shows the sum.

**page 23** The two rows at the top are a Progress Check and should be completed independently. Encourage any child who appears frustrated to use counters or the number line—this signals that more individual practice is needed. Children who miss more than two problems need additional practice also. Mastery of the addition facts is every learner's goal for this chapter.

Counting from a number with counters will help anyone who needs a method for finding a missing addend. In the first problem, the child already knows he has 15. He counts—16, 17—and lays down a counter for each number named. *How many counters down? (2) That's the missing number!*

**goal** Review of number relations

**things** large numeral cards

**warm-up** Use the following line of questioning to review the concepts of order and quantity. *What number comes before 6? after 9? Which is more—3 or 5? Which is less—11 or 19?* Manipulatives will help if there are any problems.

Mix a set of numeral cards. Have the youngsters begin with two cards and place them in order. Each additional card is then placed in order.

Direct a child to draw an arrow on the board. Discuss ways in which arrows are used. Emphasize the two directions. Write 2—4 on the board. *Which number is less—2 or 4? Use the line between the two numbers to make an arrow that points to the number that is less.* Continue to compare two numbers so that arrows are made in both directions.

**page 24** The warm-up should make the first part of the page easy. You'll want to talk about the two questions in the middle of the page after the rows have been completed.

Make sure the youngsters understand the challenge at the bottom of the page. Use numeral and symbol cards to build sentences if necessary.

24

Make an arrow point to the smaller number.

1  $\leftarrow$  2    20  $\rightarrow$  10    1  $\rightarrow$  0  
10  $\rightarrow$  9    6  $\rightarrow$  5    10  $\rightarrow$  0

**EXIT**  
**EXIT**

When you add, is your answer smaller than the numbers you add? No

$$\begin{array}{r} 1 \\ + 0 \\ \hline 1 \end{array}$$

$$\begin{array}{r} 8 \\ + 5 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 9 \\ + 1 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 10 \\ + 10 \\ \hline 20 \end{array}$$

$$\begin{array}{r} 1 \\ + 1 \\ \hline 2 \end{array}$$

Is your answer always greater than the numbers you add? No

$$\begin{array}{r} 2 \\ + 0 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 2 \\ + 1 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 0 \\ + 6 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 1 \\ + 8 \\ \hline 9 \end{array}$$

$$\begin{array}{r} 4 \\ + 4 \\ \hline 8 \end{array}$$

9 5 4

8 0 8

2 3 5

Use the numbers to fill in the blanks.

or  $\frac{4}{5} + \frac{5}{4} = \frac{9}{9}$

or  $\frac{0}{8} + \frac{8}{0} = \frac{8}{8}$

or  $\frac{3}{2} + \frac{2}{3} = \frac{5}{5}$

PURPOSE: Review of number relations.

**goal** Practice in adding with sums through 20.

**things** for each pupil:  
masks from page 14

**page 25** Half of the addition table was explored on page 14. Today is the day to complete the job. Watch for pupils who discover the pattern of answers for each row and are not actually thinking about the addition facts at all. This can be prevented by having the group fill in some of the boxes at random before you challenge the youngsters: *Fill in as many as you know.*

After the table is completed, it's out with the masks from page 14 and a look at patterns.

- Examine the numbers in each row. Find how they are alike and how they are different from the numbers in the row above and the row below.
- Examine each column (down). Discuss its relationship to the column to the left.
- Look for more than one way to find the sum of  $7 + 8$  (commutative property).

Save the masks. They will be used again on page 44.

25

# COMPLETE THE TABLE AND DELIVER TO

NAME: \_\_\_\_\_

+	0	1	2	3	4	5	6	7	8	9	10
0	0	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10	11
2	2	3	4	5	6	7	8	9	10	11	12
3	3	4	5	6	7	8	9	10	11	12	13
4	4	5	6	7	8	9	10	11	12	13	14
5	5	6	7	8	9	10	11	12	13	14	15
6	6	7	8	9	10	11	12	13	14	15	16
7	7	8	9	10	11	12	13	14	15	16	17
8	8	9	10	11	12	13	14	15	16	17	18
9	9	10	11	12	13	14	15	16	17	18	19
10	10	11	12	13	14	15	16	17	18	19	20



Did you write the same number more than once? \_\_\_\_\_

Yes

© 1974, SRA

PURPOSE: Addition practice.



See activity 10, page 50c.



Can you fill the pattern in each row?  
Fill in the blanks.

3	5	7	—	—	—	15
4	8	12	—	20	—	—
7	10	13	—	—	22	—
15	17	19	—	—	—	27



**goal** Readiness for subtraction

**warm-up** Make a number line on the overhead projector or the chalkboard. To show a jump of 5 units, where do you begin on the number line? Have a child show the jump. Don't let me fool you. Our jumper wants to come back 3 units. How could that be shown on the number line? Let the children experiment until someone positions the arrows as shown in the answer key for the last problem.

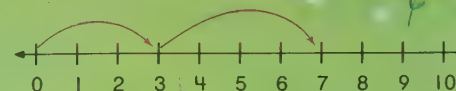
Discuss how the two kinds of arrows show **direction**. Without the **arrowheads** no one would know what is going on.

Continue with examples until everyone understands both **forward** and **backward** moves.

**page 26** Your guidance will be needed. Show all moves on the number line. Use the last question on the page to find out how much is remembered about subtraction.

26

Jan walked 3 blocks.  
Then she walked 4 blocks more.  
How far did she walk in all? 7



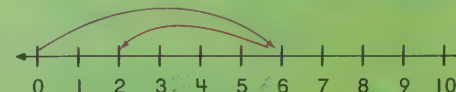
Did you add to find the answer? Yes

Sam walked 3 blocks from home.  
He walked 2 blocks back.  
How far was he from home? 1



Did you add to find the answer? No

Pam walked 6 blocks from home.  
Show it on the number line.  
She walked 4 blocks back.  
Show it on the number line.  
How far was she from home? 2



Could you add to find the answer? Yes, if the pupil thinks  $4 + \square = 6$ .  
No, if the pupil thinks  $6 - 4 = \square$ .

Could you subtract to find the answer? Yes

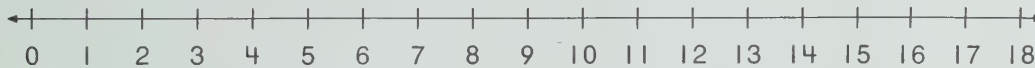
PURPOSE: Getting ready for subtraction.



**things** linoleum numeral tiles

Use the tiles from activity 2, page 50a. Stress beginning at 0 and moving to the **right** first. Then direct the pupil to move to the left.

name \_\_\_\_\_



Ring the pair that would take you closest to 0.

7 forward and 3 back

OR

7 forward and 4 back

6 forward and 3 back

6 forward and 4 back

7 forward and 2 back

OR

7 forward and 1 back

6 forward and 3 back

OR

6 forward and 2 back

6 forward and 0 back

OR

7 forward and 0 back

7 forward and 3 back

OR

6 forward and 3 back

4 forward and 3 more forward

OR

4 forward and 3 back

8 forward and 2 more forward

OR

8 forward and 2 back

7 forward and 3 more forward

OR

10 forward and 3 back

LOOK OUT!

**goal** Investigating subtraction**things** spirit master of number lines (optional)

**page 27** Make sure everyone understands the meaning of **closest**. Emphasize using the number line at the top (or copies) to check all answers. Have them work with finger movements rather than actually mark with pencil if they use the line in the book. Work with the youngsters until they can proceed with confidence. *How do you know your answer is correct?* Knowing that you know builds confidence. Check the first problem with a number line on the board.

*In which direction must the second move be made to get closer to zero? (Backward) When both moves are forward, what happens? (One goes farther away from zero.)* When checking, have some youngsters prove their answers.

Extend the lesson by having the children find two moves—one that takes them away from zero and another that brings them right back to zero again.

**goal** Showing subtraction on the number line

**memo** You have a decision to make. Do some or all of your pupils need to work with manipulatives and review the concept of subtraction before continuing in the book? Now is the time.

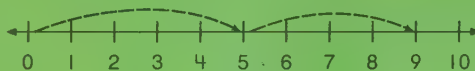
**page 28** Look out! Both addition and subtraction are on the page. Which number line shows 5 and 4 more? What number sentence tells these moves? Which number line shows 5 forward and 4 back? Tell me the number sentence. Are you sure? Show me.

Which number line shows 7 forward and 4 back? 9 forward and 7 back? Which number lines show addition? Which show subtraction?

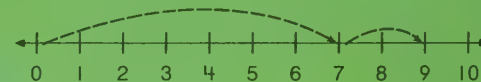
Have the youngsters trace the arrows showing the jumps and complete the sentences. Discuss the directions for the remainder of the page.

28

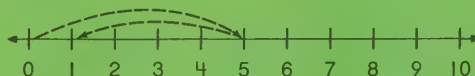
Use the number lines to complete the sentences.



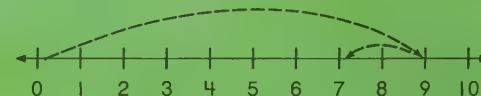
$$5 + 4 = \underline{9}$$



$$7 + 2 = \underline{9}$$

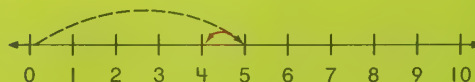


$$5 - 4 = \underline{1}$$

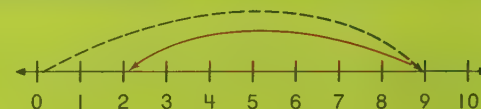


$$9 - 2 = \underline{7}$$

Show the second arrow. Then complete the sentence.



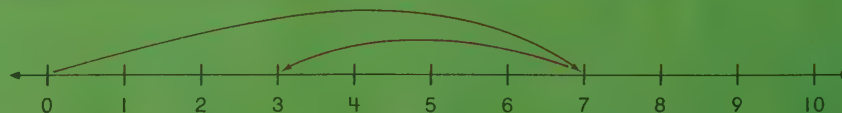
$$5 - 1 = \underline{4}$$



$$9 - 7 = \underline{2}$$

Show the subtraction on the number line.

$$7 - 4 = 3$$



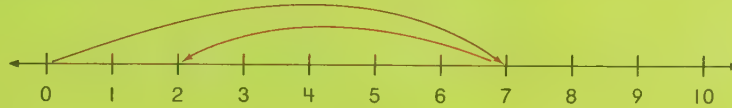
PURPOSE: Showing subtraction on the number line.



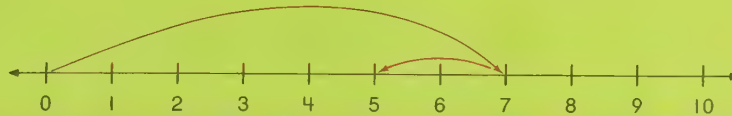
name \_\_\_\_\_

Show the subtraction on the number line. Complete the sentence.

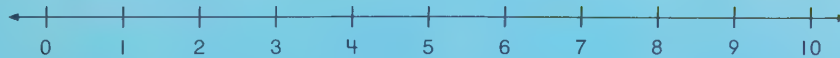
$7 - 5 = \underline{2}$



$7 - 2 = \underline{5}$



Use the number line to help you answer.



$9 - 9 = \underline{0}$

$9 - 6 = \underline{3}$

$9 - 3 = \underline{6}$

$9 - 8 = \underline{1}$

$9 - 5 = \underline{4}$

$9 - 2 = \underline{7}$

$9 - 7 = \underline{2}$

$9 - 4 = \underline{5}$

$9 - 1 = \underline{8}$

**goal** Practice with subtraction, using a number line

**page 29** Pupils capable of working independently should do so. After completing the page, examine the three columns at the bottom for patterns. *What happens going down each column? What happens when a small amount is taken away? Which answer is closer to zero— $9 - 7$  or  $9 - 3$ ?*

**goal** Review of subtracting from numbers less than 10

**things** large numeral cards for 0 through 9 for each pupil;  
numeral cards for 0 through 9

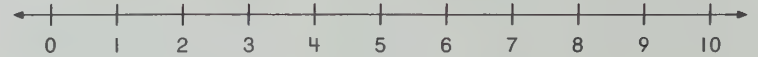
**warm-up** Show two numeral cards. Have the youngsters subtract the smaller number from the larger number and show the answer with their individual numeral cards. Hold some pairs of cards in the horizontal position and some pairs in the vertical position to develop readiness for both kinds of notation.

**page 30** Encourage pupils to use the number line when they are not sure about an answer. The problems at the top should be completed independently.

Talk about the shift from horizontal sentence to vertical form for computation. Turn those imaginations loose in completing the word problems. *Mary had 8. 8 what?*

30

**subtract**



$$7 - 3 = \underline{4}$$

$$5 - 0 = \underline{5}$$

$$9 - 5 = \underline{4}$$

$$5 - 3 = \underline{2}$$

$$9 - 6 = \underline{3}$$

$$6 - 4 = \underline{2}$$

$$8 - 3 = \underline{5}$$

$$6 - 1 = \underline{5}$$

$$4 - 4 = \underline{0}$$

$$8 - 7 = \underline{1}$$

$$8 - 4 = \underline{4}$$

$$8 - 6 = \underline{2}$$

How are these two problems alike?

How are the two problems different?

All the numbers are the same.  
The answer is the same.

$$8 - 5 = \underline{3}$$

One is written across; the other is written up and down.

$$\begin{array}{r} 8 \\ - 5 \\ \hline 3 \end{array}$$

Bill bought 7.  
He took back 2.  
How many are left? 5

Mary had 8.  
She gave her sister 3.  
How many are left? 5

PURPOSE: Subtraction practice.



name \_\_\_\_\_

This is Maria's paper. Did she make any mistakes?  
Find them and correct Maria's answer.

Maria

$$9 - 7 = \underline{2}$$

$$3 - 1 = \underline{2}$$

$$9 - 5 = \underline{\cancel{2}^4}$$

$$7 - 5 = \underline{2}$$

$$2 - 0 = \underline{\cancel{0}^2}$$

$$2 - 2 = \underline{0}$$

$$5 - 3 = \underline{2}$$

$$1 - 1 = \underline{\cancel{1}^0}$$

$$5 - 2 = \underline{3}$$

$$8 - 5 = \underline{\cancel{2}^3}$$

$$4 - 2 = \underline{2}$$

$$7 - 6 = \underline{\cancel{2}^1}$$

$$6 - 5 = \underline{1}$$

$$6 - 4 = \underline{\cancel{3}^2}$$

$$8 - 2 = \underline{\cancel{5}^6}$$

$$4 - 3 = \underline{1}$$

$$3 - 2 = \underline{1}$$

$$6 - 3 = \underline{3}$$

How many mistakes did Maria make? 7

Do you think she needs more practice? \_\_\_\_\_ (Why do you think so?)

Do you need more practice too? \_\_\_\_\_  
(Why do you think so?)

**goal** Practice in subtracting from numbers less than 10

**page 31** Finding someone else's mistakes helps the pupil develop the ability to find his own. Decide as a group how to identify the mistakes and how to show the correction. The actual marking should be independent work. When the page is completed, decide together: *What was the hardest problem Maria had? Why was it so hard?*

The last two questions may have very private answers. Discuss only on an individual basis, please.



**goal** Practice in subtracting from numbers less than 10

**page 32** The two rows of problems at the top should be completed without counters or a number line. This will help you identify pupils who need additional practice. Use counters or a number line for this additional practice. Work with flash cards by pairs of pupils is a good idea too.

Someone in your class is sure to make a good Herman. Have him act out the lines as everyone helps to write the story. Math can be fun!

32

### Subtract

$$\begin{array}{r} 4 \\ - 3 \\ \hline 1 \end{array}$$

$$\begin{array}{r} 3 \\ - 2 \\ \hline 1 \end{array}$$

$$\begin{array}{r} 8 \\ - 3 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 8 \\ - 6 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 7 \\ - 7 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 7 \\ - 0 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 9 \\ - 8 \\ \hline 1 \end{array}$$

$$\begin{array}{r} 9 \\ - 4 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 5 \\ - 1 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 3 \\ - 3 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 8 \\ - 2 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 8 \\ - 5 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 7 \\ - 5 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 7 \\ - 2 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 9 \\ - 6 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 9 \\ - 5 \\ \hline 4 \end{array}$$

**Herman had nine prizes to hide. Help write the story.**

He put one in his shirt pocket. He had 8 left.

Then he put two in his pants pocket. He had 6 left.

Then he put three under the rug. He had 3 left.

Then he put two more in the Example: piano and he had 1 left.

Then he put another one on top of the Example: chair. He had 0 left.



PURPOSE: Subtraction practice.



**things** 2 wood cubes, felt pen, counters

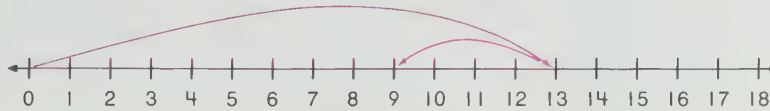
Label the faces of one cube with the numerals 0 through 5 and the faces of the second cube with the numerals 4 through 9. Pair players. In turn each player rolls the cubes and subtracts the two numbers that

land faceup. An opponent can challenge an answer. Counters may be used to settle disputes. The player who makes an error must write down the correct sentence. The player with the fewest written sentences wins.

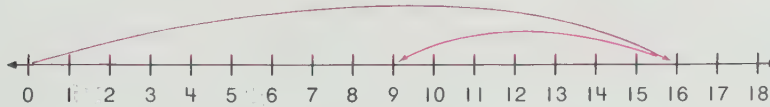
name \_\_\_\_\_

Show the subtraction on the number line. Complete the sentence.

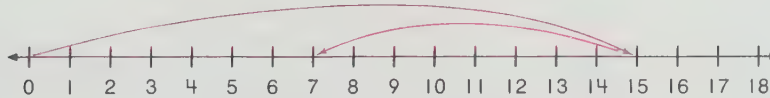
$$13 - 9 = \underline{4}$$



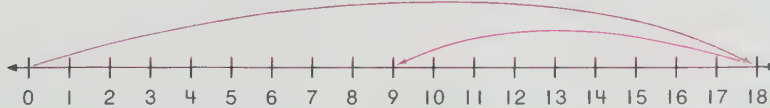
$$16 - 7 = \underline{9}$$



$$15 - 8 = \underline{7}$$



$$18 - 9 = \underline{9}$$



Bill and Sam were together.

Bill walked up 14 steps. He turned around and walked down 6 steps. Sam walked up 9 steps. He turned and went down 1 step.



Who was closer to the starting point?

Neither one

(Both were on the eighth step.)

**goal** Subtracting from numbers greater than 10 on the number line

**memo** This page begins the practice of the **hard** subtraction facts. Let the success of your pupils determine the pace at which you use these pages and the amount of additional practice needed. Establish mastery of the subtraction facts as a learning goal with your pupils.

**page 33** Using the number line should be a familiar technique by now. Everyone should be able to work independently. If any number facts cause trouble, have these demonstrated on the board by children.

The last problem is a tease. Did anyone get caught?

**goal** Review of subtracting from numbers 10 through 18

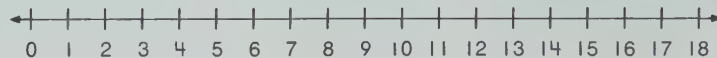
**warm-up** Ask for volunteers for a game. Line up the children any way that is convenient. The first child says a number between 10 and 18. The second child says a number between 0 and 9. The third child subtracts mentally and says the answer. Continue down the line. If a child makes a mistake, he sits down. He can rejoin the game if he can correct a mistake made by another child. Maybe you'll have some new volunteers as the game goes on.

**page 34** Everyone is on his own. Watch for pupils who are insecure and need additional help. When correcting, occasionally ask a child to prove an answer—not because you doubt it, but because you want the child to know he can prove that he is right.

Handle the challenge at the bottom of the page as a group activity. Tease by asking the youngsters to try to find one more sentence. This kind of activity will be found on pages to come.

34

**Subtract**



$$15 - 6 = \underline{9} \quad 11 - 6 = \underline{5} \quad 10 - 4 = \underline{6} \quad 17 - 9 = \underline{8}$$

$$11 - 9 = \underline{2} \quad 14 - 8 = \underline{6} \quad 11 - 5 = \underline{6} \quad 13 - 5 = \underline{8}$$

$$15 - 8 = \underline{7} \quad 16 - 7 = \underline{9} \quad 12 - 4 = \underline{8} \quad 12 - 8 = \underline{4}$$

$$12 - 6 = \underline{6} \quad 17 - 8 = \underline{9} \quad 13 - 8 = \underline{5} \quad 10 - 6 = \underline{4}$$

Write subtraction names for 6.

15 - 9   13 - 7   11 - 5   9 - 3   7 - 1   14 - 8   12 - 6   10 - 4   8 - 2   6 - 0

Also accept: 16 - 10   18 - 12   20 - 14   17 - 11   19 - 13   and so on.

PURPOSE: Subtraction practice.



**things** strips of construction paper

Write the subtraction names for 6 found by your pupils on a strip of construction paper, and add it to the bulletin-board display of addition names. Continue this activity for

pages 36, 37, and 38 where subtraction names for 7, 8, and 9 are found. Much can be learned by seeing the pairs of numbers that can be subtracted to get the same answer.



name \_\_\_\_\_

# SUBTRACT

$\begin{array}{r} 12 \\ - 5 \\ \hline 7 \end{array}$	$\begin{array}{r} 10 \\ - 5 \\ \hline 5 \end{array}$	$\begin{array}{r} 13 \\ - 8 \\ \hline 5 \end{array}$	$\begin{array}{r} 11 \\ - 9 \\ \hline 2 \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline 9 \end{array}$	$\begin{array}{r} 15 \\ - 7 \\ \hline 8 \end{array}$
--	--	--	--	--	--

$\begin{array}{r} 14 \\ - 5 \\ \hline 9 \end{array}$	$\begin{array}{r} 12 \\ - 3 \\ \hline 9 \end{array}$	$\begin{array}{r} 10 \\ - 7 \\ \hline 3 \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$	$\begin{array}{r} 18 \\ - 9 \\ \hline 9 \end{array}$	$\begin{array}{r} 16 \\ - 8 \\ \hline 8 \end{array}$
--	--	--	--	--	--

$\begin{array}{r} 10 \\ - 4 \\ \hline 6 \end{array}$	$\begin{array}{r} 13 \\ - 5 \\ \hline 8 \end{array}$	$\begin{array}{r} 12 \\ - 8 \\ \hline 4 \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline 2 \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline 9 \end{array}$	$\begin{array}{r} 15 \\ - 8 \\ \hline 7 \end{array}$
--	--	--	--	--	--

$\begin{array}{r} 13 \\ - 4 \\ \hline 9 \end{array}$	$\begin{array}{r} 11 \\ - 4 \\ \hline 7 \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline 5 \end{array}$	$\begin{array}{r} 12 \\ - 9 \\ \hline 3 \end{array}$	$\begin{array}{r} 16 \\ - 7 \\ \hline 9 \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline 6 \end{array}$
--	--	--	--	--	--

$\begin{array}{r} 11 \\ - 3 \\ \hline 8 \end{array}$	$\begin{array}{r} 10 \\ - 3 \\ \hline 7 \end{array}$	$\begin{array}{r} 14 \\ - 9 \\ \hline 5 \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline 7 \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline 8 \end{array}$	$\begin{array}{r} 16 \\ - 9 \\ \hline 7 \end{array}$
--	--	--	--	--	--



**goal** Practice in subtracting from numbers 10 through 18

**memo** Use this page to help you identify pupils who need more help and those who can move faster.

**page 35** Have each child select any four rows to complete. Everyone should look over the problems first and ring what he thinks is the hardest problem. He can skip that one for the present. A child who misses more than two problems in the four rows he selects needs more help. Observe which youngsters use counters (including fingers) or a number line. These children, too, need more practice.

Find out which problems have rings around them. Did a lot of people agree on one or two that were the hardest? Decide together how those hard problems can be made easy. You may get some great ideas for memory aids.

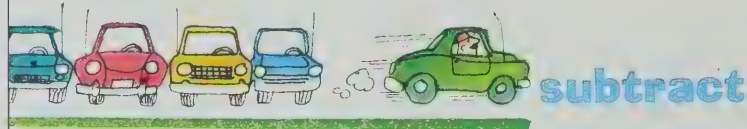


**goal** Practice in subtracting from numbers 10 through 18

**page 36** By now your pupils should have a good grasp of the subtraction facts. Assign all or part of this page to meet individual needs. Pupils who do not need the practice can skip the three rows of problems and go directly to the challenge at the bottom of the page. Teach these youngsters the game suggested for this page. (See below.) Then they can teach the others later.

You will want to find subtraction names for 7 as a group activity with pupils who still need your guidance.

36



$$\begin{array}{r} 11 \\ - 9 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 11 \\ - 5 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 17 \\ - 8 \\ \hline 9 \end{array}$$

$$\begin{array}{r} 15 \\ - 7 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 13 \\ - 9 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 18 \\ - 9 \\ \hline 9 \end{array}$$

$$\begin{array}{r} 14 \\ - 8 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 13 \\ - 5 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 11 \\ - 6 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 12 \\ - 4 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 15 \\ - 6 \\ \hline 9 \end{array}$$

$$\begin{array}{r} 17 \\ - 9 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 10 \\ - 6 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 12 \\ - 6 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 15 \\ - 9 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 16 \\ - 9 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 12 \\ - 5 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 14 \\ - 9 \\ \hline 5 \end{array}$$

Write subtraction names for 7.

16 - 9 14 - 7 12 - 5 10 - 3 8 - 1 15 - 8 13 - 6 11 - 4 9 - 2 7 - 0

Also accept: 17 - 10 19 - 12 18 - 11 20 - 13 and so on.

PURPOSE: Subtraction practice.



See activity 12, page 50c.

name \_\_\_\_\_

Maria did practice. Here is another paper she did.

Check her paper and correct her mistakes if she made any.

Maria

$\begin{array}{r} 11 \\ - 8 \\ \hline 2 \end{array}$	$\begin{array}{r} 12 \\ - 7 \\ \hline 5 \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline 9 \end{array}$	$\begin{array}{r} 14 \\ - 5 \\ \hline 9 \end{array}$	$\begin{array}{r} 16 \\ - 9 \\ \hline 17 \end{array}$	$\begin{array}{r} 11 \\ - 4 \\ \hline 87 \end{array}$	$\begin{array}{r} 14 \\ - 6 \\ \hline 8 \end{array}$
$\begin{array}{r} 12 \\ - 9 \\ \hline 3 \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline 6 \end{array}$	$\begin{array}{r} 11 \\ - 7 \\ \hline 4 \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline 8 \end{array}$	$\begin{array}{r} 16 \\ - 8 \\ \hline 8 \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline 7 \end{array}$
$\begin{array}{r} 10 \\ - 8 \\ \hline 2 \end{array}$	$\begin{array}{r} 10 \\ - 7 \\ \hline 3 \end{array}$	$\begin{array}{r} 11 \\ - 2 \\ \hline 9 \end{array}$	$\begin{array}{r} 10 \\ - 3 \\ \hline 7 \end{array}$	$\begin{array}{r} 12 \\ - 3 \\ \hline 9 \end{array}$	$\begin{array}{r} 10 \\ - 5 \\ \hline 5 \end{array}$	$\begin{array}{r} 16 \\ - 7 \\ \hline 89 \end{array}$

Write subtraction names for 8.

17 - 9   15 - 7   13 - 5   11 - 3   9 - 1   16 - 8   14 - 6   12 - 4   10 - 2   8 - 0

Also accept: 19 - 11   18 - 10   20 - 12 and so on.

**goal** Practice in subtracting from numbers 10 through 18

**page 37** Assign all or part of this page to meet individual needs. Everyone should know how to proceed—the technique is the same as on page 31. Maria is still having some trouble. Is anyone else? Why not tell a little story to offer encouragement. *Maria practiced some more, and pretty soon she got every problem right every time. You can do it too!*

You know by now which pupils can handle the challenge at the bottom of the page independently and which ones need your help.



**things** 2 wood cubes, felt pen

Extend the activity on page 32 by labeling the faces of one cube with the numerals 4 through 9 and the faces of the second cube with the numerals 11 through 16. Follow the same rules.



**goal Progress Check**—subtracting from numbers 10 through 18

**page 38** Assign all three rows for the Progress Check. Any child who makes more than one mistake hasn't reached the mastery goal yet. Use your pupils' favorite games and the activities suggested in the Resource Section of this guide.

Writing subtraction names for 9 provides an added challenge. You may be delighted with some of the correct, unexpected answers you will get.

38

# Subtract

$\begin{array}{r} 12 \\ - 9 \\ \hline 3 \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline 3 \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline 6 \end{array}$	$\begin{array}{r} 12 \\ - 8 \\ \hline 4 \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline 9 \end{array}$	$\begin{array}{r} 16 \\ - 8 \\ \hline 8 \end{array}$	$\begin{array}{r} 15 \\ - 8 \\ \hline 7 \end{array}$
$\begin{array}{r} 14 \\ - 5 \\ \hline 9 \end{array}$	$\begin{array}{r} 14 \\ - 6 \\ \hline 8 \end{array}$	$\begin{array}{r} 13 \\ - 8 \\ \hline 5 \end{array}$	$\begin{array}{r} 11 \\ - 4 \\ \hline 7 \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline 6 \end{array}$	$\begin{array}{r} 11 \\ - 2 \\ \hline 9 \end{array}$	$\begin{array}{r} 12 \\ - 3 \\ \hline 9 \end{array}$
$\begin{array}{r} 12 \\ - 7 \\ \hline 5 \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline 8 \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$	$\begin{array}{r} 11 \\ - 7 \\ \hline 4 \end{array}$	$\begin{array}{r} 16 \\ - 7 \\ \hline 9 \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline 7 \end{array}$	$\begin{array}{r} 14 \\ - 9 \\ \hline 5 \end{array}$

Write subtraction names for 9.

18 - 9   16 - 7   14 - 5   12 - 3   10 - 1   17 - 8   15 - 6   13 - 4   11 - 2   9 - 0

Also accept: 19 - 10   20 - 11, and so on.

PURPOSE: Progress check—subtraction.



See activity 13, page 50c.



See activity 14, page 50c.

name \_\_\_\_\_

Jack had 9.  
He lost 5.  
Now how many? 4

Jill bought 10.  
She gave 3 away.  
Now how many? 7

15 were in the cage.  
7 got away.  
How many remain? 8

17 came in.  
9 left.  
How many remain? 8

He made 13.  
8 broke.  
How many are left? 5

Kay put 14 in a box.  
She gave 9 away.  
Now how many? 5

Pete got 16.  
He sold 8.  
Now how many? 8

11 landed.  
4 flew away.  
How many remain? 7

18 came out.  
9 went back in.  
How many stayed out? 9

She put 14 on the shelf.  
6 fell off.  
Now how many on the shelf? 8



**goal** Application of subtraction to solve word problems

**memo** This page is a classic. Look at all the different words and phrases that signal subtraction. (And we wonder why youngsters have trouble with word problems!) You'll see an assortment of word clues throughout the book. Don't make a big deal out of the whole thing with the children. But remember, they are getting some good experience. Now if they can just read and understand the words . . .

**page 39** The stories are incomplete again. Complete them. If spelling is a problem, suggest using art instead. When checking, have some of the completed stories read aloud.

**goal** Review of number relations

**page 40** Pupils who breezed through page 24 should complete the page independently. Anyone who ran into trouble will need your help. Determine whether the problem is related to understanding the arrow symbol **or** whether the problem is one of not associating a quantity with the written numeral. Matching numeral cards with sets of manipulatives will help develop concepts of quantity.

40

Make an arrow point to the lesser number.

$$18 \rightarrow 9$$

$$0 \leftarrow 10$$

$$14 \rightarrow 13$$

$$15 \leftarrow 16$$

$$8 \leftarrow 10$$

$$10 \leftarrow 17$$

When you subtract, is your answer ever larger than the top number in your problem? No

Is your answer *a/ways* less than the top number in your problem? No

$$\begin{array}{r} 8 \\ - 8 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 17 \\ - 8 \\ \hline 9 \end{array}$$

$$\begin{array}{r} 18 \\ - 7 \\ \hline 11 \end{array}$$

$$\begin{array}{r} 9 \\ - 0 \\ \hline 9 \end{array}$$

$$\begin{array}{r} 1 \\ - 1 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 7 \\ - 0 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 9 \\ - 9 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 10 \\ - 0 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 4 \\ - 1 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 18 \\ - 0 \\ \hline 18 \end{array}$$

Use the numbers to fill in the blanks.

8 15 7

0 9 9

14 9 5

$$\text{or } \frac{15}{15} - \frac{8}{7} = \frac{7}{8}$$

$$\text{or } \frac{9}{9} - \frac{9}{0} = \frac{0}{9}$$

$$\text{or } \frac{14}{14} - \frac{5}{9} = \frac{9}{5}$$

PURPOSE: Review of number relations.

name \_\_\_\_\_

### Look for patterns as you subtract.

$\begin{array}{r} 10 \\ - 9 \\ \hline 1 \end{array}$	$\begin{array}{r} 11 \\ - 9 \\ \hline 2 \end{array}$	$\begin{array}{r} 12 \\ - 9 \\ \hline 3 \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline 4 \end{array}$	$\begin{array}{r} 14 \\ - 9 \\ \hline 5 \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline 6 \end{array}$	$\begin{array}{r} 16 \\ - 9 \\ \hline 7 \end{array}$
--	--	--	--	--	--	--

The number you subtract stays the same. As the number you subtract from goes up one, the answer goes up one.

$\begin{array}{r} 10 \\ - 0 \\ \hline 10 \end{array}$	$\begin{array}{r} 11 \\ - 0 \\ \hline 11 \end{array}$	$\begin{array}{r} 12 \\ - 0 \\ \hline 12 \end{array}$	$\begin{array}{r} 13 \\ - 0 \\ \hline 13 \end{array}$	$\begin{array}{r} 14 \\ - 0 \\ \hline 14 \end{array}$	$\begin{array}{r} 15 \\ - 0 \\ \hline 15 \end{array}$	$\begin{array}{r} 16 \\ - 0 \\ \hline 16 \end{array}$
---	---	---	---	---	---	---

When zero is subtracted, the other number doesn't change.

$\begin{array}{r} 10 \\ - 10 \\ \hline 0 \end{array}$	$\begin{array}{r} 11 \\ - 11 \\ \hline 0 \end{array}$	$\begin{array}{r} 12 \\ - 12 \\ \hline 0 \end{array}$	$\begin{array}{r} 13 \\ - 13 \\ \hline 0 \end{array}$	$\begin{array}{r} 14 \\ - 14 \\ \hline 0 \end{array}$	$\begin{array}{r} 15 \\ - 15 \\ \hline 0 \end{array}$	$\begin{array}{r} 16 \\ - 16 \\ \hline 0 \end{array}$
---	---	---	---	---	---	---

When a number is subtracted from itself, the answer is always zero.

$\begin{array}{r} 10 \\ - 7 \\ \hline 3 \end{array}$	$\begin{array}{r} 11 \\ - 7 \\ \hline 4 \end{array}$	$\begin{array}{r} 12 \\ - 7 \\ \hline 5 \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline 6 \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$	$\begin{array}{r} 15 \\ - 7 \\ \hline 8 \end{array}$	$\begin{array}{r} 16 \\ - 7 \\ \hline 9 \end{array}$
--	--	--	--	--	--	--

The number you subtract stays the same. As the number you subtract from goes up one, the answer goes up one.

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PURPOSE: Subtraction practice.

**goal** Finding patterns in subtraction problems

**page 41** Examine the first row of problems together. *Do you see anything special about these problems?* Do not expect the children to use the same words given in the answer key. They should express these ideas in their own words. *What do you think will happen in the row of answers? Will each answer be the same number?* Have them complete the first row to find out.

Complete the first few problems in the second row. *What happens when you take zero away?* Use the same technique with the third row. *What happens when you have a number and take that same number away?* Have the youngsters complete the page independently. While checking answers, talk about any additional patterns they may have seen.

Encourage your pupils to look for patterns, but don't force them to say **why** these patterns occur.



Have the children begin with 18 and subtract 3 until they can no longer subtract 3. Begin again with 18. This time subtract 4 until the number can no longer

be subtracted. Continue subtracting from 18 using 5, 6, 7, 8, and 9. Has anyone noticed some patterns?



**goal**
Application of skills and reasoning to solve problems

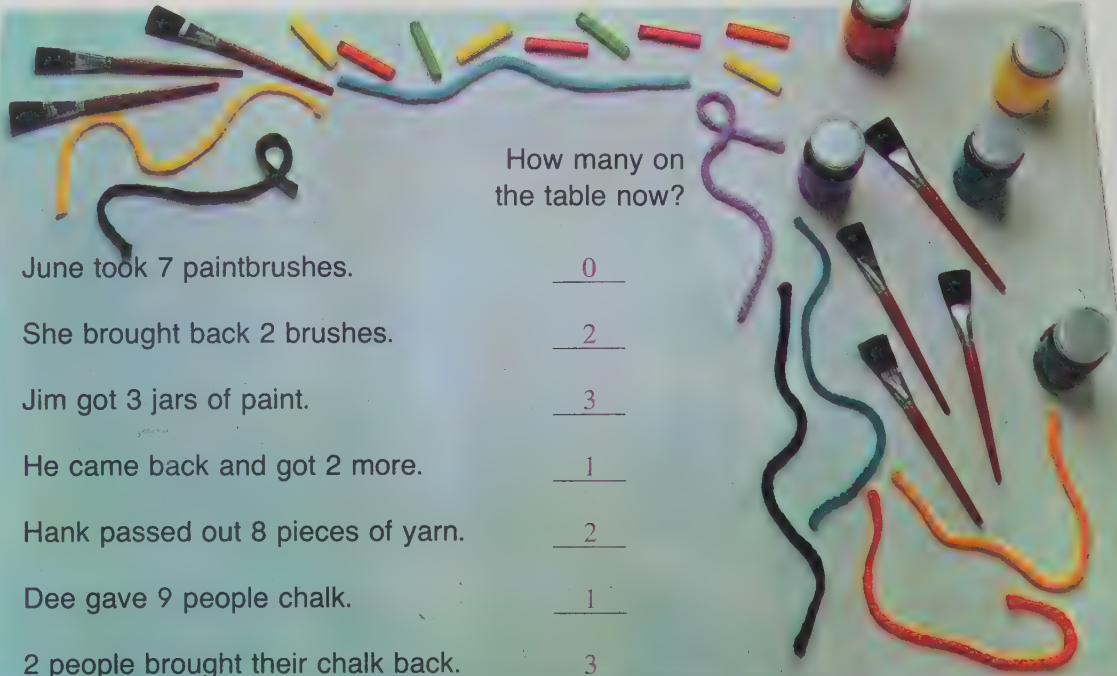
**memo**
Pages 42 and 43 use an activity approach to help develop the child's ability to solve problems. The youngsters will need to decide whether to use addition or subtraction to solve each problem. Do both pages on the same day.

**things**
brushes  
jars of paint  
yarn and string  
pieces of chalk

**page 42**
Make this lesson real for the children by doing the activities during art class. Make sure you do not have enough of each item for every child. This will force them to keep track of the supplies and bring them back to the supply table. Have the children make yarn (or string), paint, and chalk designs as part of the lesson.

**HAVE FUN!**

It was time for art. The class divided into groups. Everyone had paper. Other things to use were on the table.



How many on the table now?

June took 7 paintbrushes. 0

She brought back 2 brushes. 2

Jim got 3 jars of paint. 3

He came back and got 2 more. 1

Hank passed out 8 pieces of yarn. 2

Dee gave 9 people chalk. 1

2 people brought their chalk back. 3

PURPOSE: Problem solving.

name \_\_\_\_\_

It was time for art to end. Everyone helped to clean up.



5 brushes were returned.

5 jars of paint were brought back.

None of the yarn was returned.

6 pieces of chalk were returned.

How many  
are on the  
table now?

7

6

2

9

Did anyone forget to return something? Yes (unless it got used up.)

What was missing? 1 piece of chalk  
8 pieces of yarn

Have you ever  
cut designs from  
folded paper?

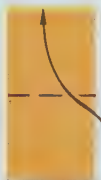
*Try it. It's fun!*



FOLD



FOLD  
AGAIN



Now you are  
ready to cut  
out your  
design.



**goal** Application of skills and reasoning  
to solve problems

**things** 7 paintbrushes  
6 jars of paint  
yarn  
10 pieces of chalk  
scissors  
paper

**page 43** When the art activities are  
finished, set up a table with supplies as  
shown on page 42. Work pages 42 and 43  
together. Have the children actually take  
the supplies from the display table and  
decide how many are left.

Cutting shapes from folded paper is an  
interesting activity. Can the youngster  
predict how the finished design will look  
when the paper is unfolded?

**goal** Exploration of the subtraction table

**things** for each pupil:  
masks from page 14

**page 44** Each child should cover all but the first row of answer boxes of the table. *Where did the 9 in the first answer box come from? What will you do next? Have the pupils complete the first row. Tease them by saying that they must be simply copying the numbers from above. Why are the answers the same? Don't let me fool you—what if you subtract 0 from 24? 0 from 103? 0 from 999?*

Have the pupils use the mask to determine where the 8, the 11, and the 6 in the table come from. Continue with the mask and ask them to locate these pairs.

$$\begin{array}{r} 15 \\ - 8 \\ \hline \end{array} \quad \begin{array}{r} 17 \\ - 3 \\ \hline \end{array} \quad \begin{array}{r} 13 \\ - 5 \\ \hline \end{array} \quad \begin{array}{r} 11 \\ - 7 \\ \hline \end{array}$$

Your purpose is to draw attention to the subtraction and prevent your pupils from simply following the pattern of answers across each row.

After the table is completed, have them look for patterns. *Can the answer for  $11 - 3$  be found in more than one place? (No—subtraction is not commutative.)*

Extend the ideas of the lesson with some “good thinking” questions. *If you had 6 cookies, could you give away 5? How many would you have left? Could you give away 6? How many would you have left? If you had only 3, could you give away 4? What is the most you could give away?*

44

**Try this.** Subtract each number on the side from each number across the top. You will find patterns here too.


—	9	10	11	12	13	14	15	16	17	18	
0	9	10	11	12	13	14	15	16	17	18	
1	8	9	10	11	12	13	14	15	16	17	
2	7	8	9	10	11	12	13	14	15	16	
3	6	7	8	9	10	11	12	13	14	15	
4	5	6	7	8	9	10	11	12	13	14	
5	4	5	6	7	8	9	10	11	12	13	
6	3	4	5	6	7	8	9	10	11	12	
7	2	3	4	5	6	7	8	9	10	11	
8	1	2	3	4	5	6	7	8	9	10	
9	0	1	2	3	4	5	6	7	8	9	


PURPOSE: Subtraction practice.


(This will be filled if page activity is extended.)


name \_\_\_\_\_


You use addition and subtraction all the time. You go to the store.

You have  How much money do you have? 15¢

You want  It costs 10¢. Do you have enough money? Yes


You buy the  How much money do you have left? 5¢

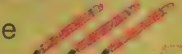
You have  How much money do you have? 7¢


You want  It costs 8¢. Do you have enough money? No


How much more do you need? 1¢


You have  How much money do you have? 18¢

You want  They cost 5¢. Do you have enough money? Yes

You buy the  How much money do you have left? 3¢

You have  How much money do you have? 16¢

You want  It cost 9¢. Do you have enough money? Yes

You buy the  How much money do you have left? 7¢

**goal** Application of addition and subtraction

**things** actual coins  
objects shown on page

**page 45** The question is—can each pupil use the ideas that have been learned? Have **the children** figure out how to do the first problem. Let those who are capable finish the page by themselves while you work with the others. Use actual coins and objects to dramatize each problem situation with this group.

Talk about the answers together. *When did you need to use addition? When did you use subtraction?*



**goal** Application of addition and subtraction.

**memo** The emphasis on this page is on subtraction.

**page 46** *What's this page all about?*  
*Will you be doing both addition and subtraction? How will you know when to use subtraction?* Work the first problem together. Let those who are capable complete the page independently. As you work with the others, try to diagnose their difficulty.

- Is the cent symbol causing confusion?
- Do pupils know whether they have enough money? (Comparison of numbers)
- Can they compute how much money they have left? (Subtraction)





Have these youngsters dramatize each problem with actual coins to develop understanding. Provide appropriate additional practice.

	He wants	Does he have enough ¢?	Now how many ¢?
 has 18¢	 10¢	yes <input checked="" type="checkbox"/> no <input type="checkbox"/>	<u>8</u> ¢
 has 15¢	 25¢	yes <input type="checkbox"/> no <input checked="" type="checkbox"/>	<u>15</u> ¢
 has 11¢	 8¢	yes <input checked="" type="checkbox"/> no <input type="checkbox"/>	<u>3</u> ¢
 has 17¢	 9¢	yes <input checked="" type="checkbox"/> no <input type="checkbox"/>	<u>8</u> ¢
 has 10¢	 15¢	yes <input type="checkbox"/> no <input checked="" type="checkbox"/>	<u>10</u> ¢
 has 14¢	 8¢ 8¢	yes <input type="checkbox"/> no <input checked="" type="checkbox"/>	<u>14</u> ¢
 has 16¢	 10¢	yes <input checked="" type="checkbox"/> no <input type="checkbox"/>	<u>6</u> ¢
 has 5¢	 5¢	yes <input checked="" type="checkbox"/> no <input type="checkbox"/>	<u>0</u> ¢



Put an X next to the one who spent the most money. (Expect only one X to be marked.)

PURPOSE: Application of addition and subtraction.

name \_\_\_\_\_

	She spent	How much money left?	She earned	How much money now?
 had 15¢	7¢	<u>8</u> ¢	7¢	<u>15</u> ¢
 had 10¢	10¢	<u>0</u> ¢	10¢	<u>10</u> ¢
 had 18¢	9¢	<u>9</u> ¢	9¢	<u>18</u> ¢
 had 14¢	8¢	<u>6</u> ¢	8¢	<u>14</u> ¢

Now do these.

 had 16¢	7¢	<u>9</u> ¢	5¢	<u>14</u> ¢
 had 17¢	17¢	<u>0</u> ¢	0¢	<u>0</u> ¢

Put a ✓ by the girl who spent the most.  
Put a ✕ by the girl who earned the most.  
Ring the girl who has the most money now.



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PURPOSE: Application of addition and subtraction.



Give the game described in activity 12, page 50c, a new twist. Now when laying down 3 cards, the player can make either an addition or subtraction sentence. Sooner or later the players will discover that the same 3 cards can be used to make several sentences. For example, cards 3, 5, and 8

could be played:  $3 + 5 = 8$      $8 - 5 = 3$   
 $5 + 3 = 8$      $8 - 3 = 5$

Don't tell the secret. Let the players have the joy of discovering it themselves.

The game can be extended to include numeral cards through 18.

**goal** Application of addition and subtraction

**page 47** *What's going on?* Work the first problem together. *What happens when you spend money? What happens when you earn money? When will you add? When will you subtract?*

Use the same procedures you used on pages 45 and 46.

**goal** Application of addition and subtraction

**page 48** Challenge your pupils to tell you how to proceed. When directions are clear, children who are capable work independently. When checking, disagree a few times so that the child must show how he got his answer. The emphasis is on mental computation, but you might ask for a sentence (addition or subtraction) to be written on the board to **prove** the answer.

48

You have	You earn	How much now?	You spent	How much left?
6¢	7¢	<u>13</u> ¢	8¢	<u>5</u> ¢
8¢	6¢	<u>14</u> ¢	7¢	<u>7</u> ¢
9¢	4¢	<u>13</u> ¢	1¢	<u>12</u> ¢
5¢	10¢	<u>15</u> ¢	6¢	<u>9</u> ¢
4¢	8¢	<u>12</u> ¢	9¢	<u>3</u> ¢
0¢	17¢	<u>17</u> ¢	8¢	<u>9</u> ¢
7¢	6¢	<u>13</u> ¢	9¢	<u>4</u> ¢
1¢	15¢	<u>16</u> ¢	8¢	<u>8</u> ¢
10¢	8¢	<u>18</u> ¢	5¢	<u>13</u> ¢

PURPOSE: Application of addition and subtraction.

name \_\_\_\_\_

Pick any three columns and compute.

$$4 + 2 = \boxed{6}$$

$$4 - 2 = \boxed{2}$$

$$3 + 8 = \boxed{11}$$

$$8 - 3 = \boxed{5}$$

$$3 + 5 = \boxed{8}$$

$$5 - 3 = \boxed{2}$$

$$7 + 5 = \boxed{12}$$

$$7 - 5 = \boxed{2}$$

$$1 + 7 = \boxed{8}$$

$$7 - 1 = \boxed{6}$$

$$5 + 4 = \boxed{9}$$

$$5 - 4 = \boxed{1}$$

$$9 + 5 = \boxed{14}$$

$$9 - 5 = \boxed{4}$$

$$3 + 7 = \boxed{10}$$

$$7 - 3 = \boxed{4}$$

$$3 + 1 = \boxed{4}$$

$$3 - 1 = \boxed{2}$$

$$6 + 9 = \boxed{15}$$

$$9 - 6 = \boxed{3}$$

$$4 + 6 = \boxed{10}$$

$$6 - 4 = \boxed{2}$$

$$5 + 0 = \boxed{5}$$

$$5 - 0 = \boxed{5}$$

$$0 + 8 = \boxed{8}$$

$$8 - 0 = \boxed{8}$$

$$8 + 2 = \boxed{10}$$

$$8 - 2 = \boxed{6}$$

$$6 + 6 = \boxed{12}$$

$$6 - 6 = \boxed{0}$$

$$4 + 9 = \boxed{13}$$

$$9 - 4 = \boxed{5}$$

**goal** Checkout—addition and subtraction facts

**memo** The addition and subtraction facts have been tested separately. On pages 49 and 50, they are tested together. A different thought process is involved. Go as fast as you can. Try these pages yourself. You will quickly find yourself looking at the operation sign first and then at the numbers. Please take two days to do these two pages.

**things** flash cards

**warm-up** Review the addition and subtraction facts, using flash cards. At first do each operation separately; then do them together.

**page 49** To help focus on the operation sign, you may want to guide your pupils' thinking by doing the first column with them. *Look at the sign. Add or subtract? Do it. What sign do you see? Good! Do it.*

As the pupils work independently, observe those who appear frustrated by the changing operation signs. First have them find all the addition problems. Then they can go back and complete the subtraction problems. Those who need some form of counting aid should be grouped with those who make more than two mistakes. These children need more practice before going on to page 50.



See activity 15, page 50d.



See activity 16, page 50d.



**goal Checkout**—addition and subtraction facts

**memo** Do not use this page with anyone who can't handle mixed addition and subtraction facts with confidence. Go on to chapter 2, continue the mixed practice, and then come back when the pupil is ready.

Pupils who made no mistakes on page 49 can skip this page. You may want them to come back at another time if additional reinforcement is necessary.

**page 50** Have each pupil select two columns to complete. Check the results. If more practice is indicated, provide it before having the pupil complete the remaining columns. A pupil who makes no mistakes on the columns selected can skip the remaining columns.

**Reward good work.**

50

Pick any two columns and compute.

$6 + 4 = \underline{10}$

$16 - 7 = \underline{9}$

$5 + 8 = \underline{13}$

$17 - 8 = \underline{9}$

$9 + 0 = \underline{9}$

$13 - 9 = \underline{4}$

$5 + 7 = \underline{12}$

$14 - 6 = \underline{8}$

$9 + 6 = \underline{15}$

$9 + 4 = \underline{13}$

$14 - 9 = \underline{5}$

$8 + 8 = \underline{16}$

$18 - 9 = \underline{9}$

$8 + 9 = \underline{17}$

$13 - 6 = \underline{7}$

$7 + 9 = \underline{16}$

$15 - 8 = \underline{7}$

$6 + 7 = \underline{13}$

$8 + 4 = \underline{12}$

$11 - 4 = \underline{7}$

$8 + 6 = \underline{14}$

$13 - 8 = \underline{5}$

$9 + 9 = \underline{18}$

$10 - 4 = \underline{6}$

$7 + 3 = \underline{10}$

$15 - 9 = \underline{6}$

$5 + 6 = \underline{11}$

$4 + 7 = \underline{11}$

$10 - 3 = \underline{7}$

$7 + 8 = \underline{15}$

$11 - 8 = \underline{3}$

$5 + 9 = \underline{14}$

$9 - 9 = \underline{0}$

$7 + 7 = \underline{14}$

$12 - 9 = \underline{3}$

$0 + 0 = \underline{0}$

PURPOSE: Checkout—addition and subtraction.



See activity 17, page 50d.



See activity 18, page 50d.

# RESOURCES

## another form of evaluation

for progress check – page 13

Add.

$1 + 7 = \underline{8}$	$2 + 0 = \underline{2}$
$2 + 8 = \underline{10}$	$4 + 4 = \underline{8}$
$5 + 4 = \underline{9}$	$2 + 9 = \underline{11}$
$10 + 0 = \underline{10}$	$7 + 3 = \underline{10}$
$3 + 2 = \underline{5}$	$4 + 2 = \underline{6}$
$1 + 1 = \underline{2}$	$1 + 6 = \underline{7}$
$4 + 6 = \underline{10}$	$5 + 5 = \underline{10}$
$1 + 8 = \underline{9}$	$3 + 4 = \underline{7}$
$7 + 2 = \underline{9}$	$3 + 6 = \underline{9}$
$1 + 9 = \underline{10}$	$0 + 4 = \underline{4}$
$0 + 1 = \underline{1}$	$5 + 2 = \underline{7}$
$5 + 3 = \underline{8}$	$2 + 6 = \underline{8}$

for progress check – page 18

Add.

$3 + 3 = \underline{6}$	$3 + 9 = \underline{12}$
$1 + 4 = \underline{5}$	$8 + 4 = \underline{12}$
$3 + 5 = \underline{8}$	$2 + 7 = \underline{9}$
$0 + 1 = \underline{1}$	$5 + 6 = \underline{11}$
$4 + 3 = \underline{7}$	$7 + 4 = \underline{11}$
$3 + 2 = \underline{5}$	$3 + 8 = \underline{11}$

---

$6 + 5 = \underline{11}$	$9 + 8 = \underline{17}$
$2 + 8 = \underline{10}$	$7 + 6 = \underline{13}$
$4 + 6 = \underline{10}$	$8 + 6 = \underline{14}$
$5 + 7 = \underline{12}$	$9 + 7 = \underline{16}$
$3 + 6 = \underline{9}$	$5 + 9 = \underline{14}$
$9 + 4 = \underline{13}$	$8 + 7 = \underline{15}$

for progress check – page 23

Add.

$7$	$8$	$6$	$3$	$7$
$+ 4$	$+ 8$	$+ 7$	$+ 8$	$+ 5$
$\underline{11}$	$\underline{16}$	$\underline{13}$	$\underline{11}$	$\underline{12}$

$5$	$9$	$6$	$7$	$6$
$+ 6$	$+ 9$	$+ 4$	$+ 9$	$+ 8$
$\underline{11}$	$\underline{18}$	$\underline{10}$	$\underline{16}$	$\underline{14}$

$9$	$7$	$8$	$9$	$7$
$+ 8$	$+ 7$	$+ 5$	$+ 6$	$+ 8$
$\underline{17}$	$\underline{14}$	$\underline{13}$	$\underline{15}$	$\underline{15}$

for progress check – page 38

Subtract.

$12$	$11$	$14$	$11$	$15$
$- 6$	$- 9$	$- 8$	$- 5$	$- 7$
$\underline{6}$	$\underline{2}$	$\underline{6}$	$\underline{6}$	$\underline{8}$

$11$	$13$	$12$	$15$	$13$
$- 6$	$- 5$	$- 7$	$- 6$	$- 9$
$\underline{5}$	$\underline{8}$	$\underline{5}$	$\underline{9}$	$\underline{4}$

$14$	$11$	$12$	$14$	$16$
$- 9$	$- 4$	$- 5$	$- 6$	$- 9$
$\underline{5}$	$\underline{7}$	$\underline{7}$	$\underline{8}$	$\underline{7}$

for checkout – page 49

Pick any two columns and compute.

$8 - 4 = \underline{4}$	$3 - 2 = \underline{1}$	$7 - 5 = \underline{2}$
$4 + 8 = \underline{12}$	$2 + 3 = \underline{5}$	$5 + 7 = \underline{12}$
$8 - 6 = \underline{2}$	$3 - 3 = \underline{0}$	$9 - 5 = \underline{4}$
$6 + 8 = \underline{14}$	$3 + 3 = \underline{6}$	$5 + 9 = \underline{14}$
$8 - 5 = \underline{3}$	$3 - 0 = \underline{3}$	$9 - 4 = \underline{5}$
$5 - 3 = \underline{2}$	$3 + 0 = \underline{3}$	$4 + 6 = \underline{10}$
$3 + 5 = \underline{8}$	$7 - 6 = \underline{1}$	$6 - 4 = \underline{2}$
$5 - 0 = \underline{5}$	$6 + 7 = \underline{13}$	$4 + 4 = \underline{8}$
$0 + 5 = \underline{5}$	$6 - 6 = \underline{0}$	$4 - 4 = \underline{0}$
$5 - 2 = \underline{3}$	$6 + 6 = \underline{12}$	$3 - 1 = \underline{2}$
$2 + 5 = \underline{7}$	$6 - 0 = \underline{6}$	$1 + 3 = \underline{4}$
$5 + 6 = \underline{11}$	$0 + 6 = \underline{6}$	$3 + 9 = \underline{12}$
$6 - 5 = \underline{1}$	$6 + 7 = \underline{13}$	$9 - 3 = \underline{6}$
$4 + 5 = \underline{9}$	$7 - 6 = \underline{1}$	$7 - 0 = \underline{7}$
$5 - 4 = \underline{1}$	$4 + 9 = \underline{13}$	$0 + 7 = \underline{7}$
$4 - 2 = \underline{2}$	$9 - 4 = \underline{5}$	$0 - 0 = \underline{0}$
$2 + 4 = \underline{6}$	$4 + 8 = \underline{12}$	$0 + 0 = \underline{0}$

for checkout – page 50

Pick any two columns and compute.

$4 + 7 = \underline{11}$	$6 + 7 = \underline{13}$	$5 + 9 = \underline{14}$
$11 - 7 = \underline{4}$	$16 - 9 = \underline{7}$	$15 - 8 = \underline{7}$
$7 + 9 = \underline{16}$	$5 + 8 = \underline{13}$	$3 + 8 = \underline{11}$
$17 - 9 = \underline{8}$	$11 - 8 = \underline{3}$	$12 - 3 = \underline{9}$
$9 + 4 = \underline{13}$	$8 + 6 = \underline{14}$	$7 + 8 = \underline{15}$
$13 - 4 = \underline{9}$	$18 - 9 = \underline{9}$	$8 - 7 = \underline{1}$
$4 + 8 = \underline{12}$	$8 + 8 = \underline{16}$	$18 - 9 = \underline{9}$
$14 - 6 = \underline{8}$	$9 + 8 = \underline{17}$	$8 + 9 = \underline{17}$
$6 + 5 = \underline{11}$	$16 - 9 = \underline{7}$	$13 - 8 = \underline{5}$
$16 - 7 = \underline{9}$	$4 + 9 = \underline{13}$	$4 + 8 = \underline{12}$
$7 + 3 = \underline{10}$	$14 - 5 = \underline{9}$	$14 - 9 = \underline{5}$
$11 - 3 = \underline{8}$	$9 + 5 = \underline{14}$	$6 + 9 = \underline{15}$
$3 + 9 = \underline{12}$	$13 - 5 = \underline{8}$	$16 - 8 = \underline{8}$
$13 - 9 = \underline{4}$	$5 + 6 = \underline{11}$	$14 - 8 = \underline{6}$
$9 + 9 = \underline{18}$	$13 - 6 = \underline{7}$	$2 + 8 = \underline{10}$
$9 + 2 = \underline{11}$	$3 + 7 = \underline{10}$	$12 - 5 = \underline{7}$
$10 - 2 = \underline{8}$	$10 - 7 = \underline{3}$	$7 + 5 = \underline{12}$

## activities

**1. things** magazines, paste, manila paper, shoelace

Everyone can work on making a number dictionary. Include as many pages as your pupils are interested in making—one page for each number. The page is to contain the written numeral, the numeral word, and pictures cut from magazines to represent the quantity of the number featured on the page. When the pages are finished, string them together with a shoelace. As 2- and 3-digit numbers are introduced, more pages can be added.

**2. things** 13 linoleum tiles, masking tape, felt pen

With a felt pen write one numeral from 0 through 12 on each tile. Have the youngsters arrange the tiles on the floor so that the numbers are in order with 0 on the left and 12 on the far right. You may want to tape the tiles together now (on the back) to keep them from

slipping in the next part of the activity. Choose one child to be in charge of instructions that the other children carry out. Example: *Begin at 0. Move 2 spaces to the right. Where are you?* (2) *Move another 4 spaces to the right. Where are you?* (6) Stress beginning at 0 and moving to the right.

**3. things** coloring books, tagboard, carbon paper, crayons, scissors,  $\frac{1}{4}$ -inch dowel rod, masking tape

Let each pupil choose a picture from a coloring book of something that hops or flies. For example, kangaroo, rabbit, frog, bee. Trace the picture onto tagboard, using carbon paper. Each youngster can color his own animal and then cut it out. Attach the animal to the end of the dowel with masking tape. The youngster is now ready to show jumps on a chalkboard or desk number line. (See suggestions on pages 5 and 6 for making desk number line.) The animal is used in the same way as a stick puppet.

**4. things** for each group: 2 sets of numeral cards for 1 through 10, flash cards showing addition facts with sums 1 through 10

Pupils work in groups of three. One person is captain in charge of the flash cards. The captain sits facing the other 2 players, who both place a set of numeral cards in order before them. The flash cards are shuffled and the first is displayed—without the answer showing. Each player tries to be the first to select the correct answer from his cards and place it before the captain. The flash card is turned over to verify the answer. If the answer is correct, the player keeps the flash card. After all the flash cards have been shown, the player with the most flash cards becomes the captain for the next round.

**5. things** for each group: 4 sets of numeral cards for 0 through 9

Pupils play in groups of four. The cards are shuffled and dealt facedown. Each player receives 10 cards, which are to remain facedown in a stack. The object of the game is to form combinations of numbers whose sum is 10. To do this, the player to the left of the dealer turns his top card faceup. The next player to the left does the same.

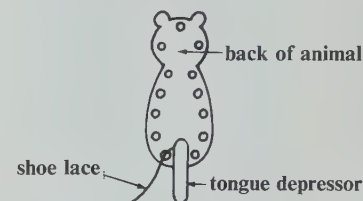
- If the sum of the 2 cards is 10, the holder of the second card says, "Tingle ten." He picks up the 2 cards, and places them facedown under his stack.
- If the sum of the 2 cards is greater than 10, the second card is again turned facedown and placed under the player's stack. Play continues to the next player to the left.
- As long as the sum of the cards is less than 10, the cards are left faceup. The player turning over the card that forms a sum of 10 says, "Tingle ten" and takes all the faceup cards.

Play continues until a player has won all the cards.

**6. things** coloring book, tagboard, carbon paper, crayons, scissors, tongue depressors, shoelace, paper punch, masking tape, felt marker

Find a large picture of an animal. The picture should be simple in design. Trace it onto tagboard, using carbon paper. Use a felt pen to write 1-digit numerals near the outer edge of the animal. Have the children color the picture and cut it out. Punch a hole with a paper punch near each numeral. Attach one end of the shoelace and tongue depressor to the back of the animal with masking tape as shown. On the front of the depressor write a plus sign and a 1-digit number. On the back of the animal and next to each hole, write the sum of the number on the depressor and the number on the front.

Pupils work in pairs. One pupil pushes the loose end of the shoelace through a hole and gives the sum of the number by the hole and the number on the depressor. The other pupil verifies the answer with the answer given next to the hole on the back.



**7. things** for each pair of players: large piece of poster board, 2 beanbags, counters

Make a 3-by-3 array of squares on the poster board. Write a large numeral from 1 through 9 in each square. Tape the game board to the floor or table. Players alternate throwing the beanbags onto the board from a distance of 3 feet. The player adds the numbers in the 2 squares on which the bags land. If the opponent agrees that the sum is correct, the player scores 1 point. The opponent who can prove the sum is incorrect, using the counters, scores 2 points. At the end of playing time, the player with more points wins.

A bag may touch more than 1 square. A player may throw the bag again or score an additional point for each additional number added correctly.

**8. things** tagboard, patterns of a duck and a duckling, carbon paper, crayons, scissors, felt pen

Have the children make 9 ducks and enough ducklings for all the addition facts with sums 10 through 18 by tracing the pattern onto tagboard with carbon paper. Use the felt pen to write a numeral from 10 through 18 on each duck and an addition fact on each duckling. Time out for coloring and then cutting out the ducks and ducklings.

Have the ducks placed around the room so that each numeral is clearly visible. Now the fun begins. The ducklings must be sorted so that they are in the correct family. For example: The 10 family will consist of duck 10 and ducklings  $9 + 1$ ,  $8 + 2$ ,  $7 + 3$ , and  $6 + 4$ . No other ducklings belong in this family.

**9. things** 24-bottle wood case, adhesive tape, addition flash cards, egg timer or stopwatch

You may want to paint the wood case to make it more attractive. Use the tape to label 19 of the slots with the numerals 0 through 18.

Use this activity with pupils who **know** the facts. The focus is speed. The pupil places each flash card in the slot labeled with the answer. An egg timer or stopwatch can be used to keep time. One point is scored for each card put in its correct slot. One point is subtracted for each error.

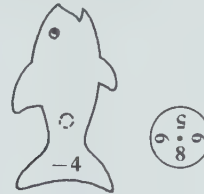
The pupils may want to compete with themselves or with their classmates. Times and scores can be kept on a chart.

**10. things** for each group: 3 sets of numeral cards 0 through 18

As many as 6 pupils may play in a group. The cards are shuffled and each player is dealt 8 cards. The remaining cards are placed facedown in a stack. The top card is turned faceup. The player to the right of the dealer lays down all the pairs of cards in his hand that add to the sum shown on the faceup card. Play continues to the right, ending with the dealer. When everyone has played, the cards laid down are set to one side out of play and the top card in the stack is turned faceup. The first player out of cards is the winner and becomes the new dealer.

**11. things** tagboard, felt pen, paper fasteners

On tagboard outline several fish and a circular disk for each fish as shown.



Cut out the fish and the small circle shown above the tail of the fish. On each tail write a direction such as  $-4$  or  $-6$ . Around the outer edge of the disk write numerals greater than or equal to the number on the tail. Place the disk **on top** of the fish and attach it in the center with a paper fastener. Turn the disk so that a number on the disk is aligned with the direction on the tail to form a subtraction fact. Turn the fish over and write the remainder inside the circular window. Repeat for each number on the disk.

Pupils work in pairs—one pupil verifying the other's answers with those that appear inside the window on the back of the fish. Exchange fish for more practice.

**12. things** for each group: 4 sets of numeral cards for 1 through 9

Form groups of 2 to 4 players. The cards are shuffled and 5 cards are dealt facedown to each player. The remaining cards are placed facedown in a stack. The top card is turned faceup to form a discard stack.

The first player draws a card from either stack and includes it with the cards in his hand. He examines his cards to find 3 that form a subtraction sentence. For example, cards 8, 5, and 3 can form the sentence  $8 - 5 = 3$  or  $8 - 3 = 5$ . If he can form a sentence, he lays down the 3 cards and says the sentence aloud. One point is earned for every correct sentence.

If an opponent can prove that the sentence is not true, the cards go back into the player's hand and he loses his next turn to draw a card. Before play passes, the player must discard a card.

If a player chooses to draw a card from the discard stack, he must pick up the **entire** stack. The game ends when a player can lay down all his cards. One card can be discarded at this time.

**13. things** paper plates, snap clothespins, container

Write the facts with which the pupils need additional practice around the edge of a paper plate and the difference for each fact on a clothespin. Mix the clothespins in a container. The pupil matches each clothespin with the appropriate fact by attaching the clothespin to the plate.

**14. things** subtraction-fact flash cards, container; for each player: game board, markers

Each player will need a game board as shown. Vary the arrangement of numerals on the boards, using only the numerals 0 through 9.

1	6	2
5	9	7
8	4	3

Select a caller. Mix the flash cards in the container. The caller draws a flash card and holds it up for the players to see. Any player who has the difference on his game board covers it with a marker. Three markers in a row, column, or diagonal win.



**15. things** 12" strips of adding-machine tape, stapler

Have each youngster make a paper bug by stapling 2 strips of paper together at one end, braiding the strips, and then stapling the other end. A funny head can be stapled to one end. When the bug is complete, an addition or subtraction problem is written on each segment of the bug. The pupil writes the answers to these problems on a separate piece of paper. After the answers are checked, have the youngsters exchange bugs for more practice.

**16.** Everyone sits in a circle. Select a fox to stand in the center of the circle of geese. The fox calls a goose by name and says an addition or subtraction fact. A goose who does not give the correct answer is caught and must join the fox in the center of the circle. Another goose is named and play continues. A caught goose can escape by giving the correct answer when the fox accepts a wrong answer or by giving an answer before a named goose can give it. After a period of play, choose a new fox.

**17. things** 9 each of 2 colors of snap clothespins, coat hanger

Group pupils who are still having trouble, and use a visual-tactile approach. Have a pupil show each addend of an addition sentence by attaching clothespins of a different color to the coat hanger. All the pupils participating in the activity record the sentence shown. Have the clothespins of one color removed. Everyone records the appropriate subtraction sentence. Continue by having someone else form another addition sentence.

**18. things** oaktag for game boards, addition and subtraction flash cards, markers

Each player needs a game board that consists of a 4-by-4 array of squares. A numeral from 0 through 18 is written in each square in random order. The flash cards are shuffled and placed facedown in a stack. A leader is chosen to display one card at a time, drawing from the top of the stack each time. Any player who has the answer on his board for the fact shown covers the answer with a marker. First player to cover 4 spaces vertically, horizontally, or diagonally is the winner.

## additional learning aids

**operation**—chapter objectives 1, 2, 3, 4, 5, and 6

### SRA products

*Arithmetic Fact Kit*, SRA (1969)

Addition cards: 1–15, 19–23

Subtraction cards: 1–20, 23–25

*Computapes*, SRA (1972)

Module 1, Lessons: AS 1, 2, 3, 5, 6, 13, 14, 15, 16, 17

*Inquisitive™ Games: Exploring Numbers and*

*Space*, SRA (1967)

Buy and Sell Game II

Theater Tickets Games I and II

*Mathematics Involvement Program*, SRA (1971)

Cards: 221, 32, 52, 102, 132, 142, 152, 252, 13, 23, 63

*Skill through Patterns, level 2*, SRA (1974)

Spirit masters: 1, 2, 3, 4, 7

*Visual Approach to Mathematics, level 2*,

SRA (1967)

Visuals: 2, 7

**other learning aids** (described on page 128f)—  
Abacus Board, Arithmetic Tube, Counting Blocks, Counting Chips, Cuisenaire Rods\*, Hainstock Blocks, I Win, Keyboard Counter, Make and Take Game, Mathfacts Games\*\*, Mini Veri-Tech, Orbiting the Earth, Quizmo\*\*\* (add-subtract), Plus 'n' Minus

\*Registered trademark of Cuisenaire Co. of America, Inc.

\*\*Trademark of Milton Bradley Co.

\*\*\*Registered trademark of Milton Bradley Co.

# 2

## NUMBER RELATIONS

**before this chapter the learner has —**

1. Compared two numbers less than 100 by saying “greater than,” “less than,” or “equal to”
2. Mastered saying and writing the sum for an addition fact
3. Counted from a number to a number
4. Shown addition on the number line

**in chapter 2 the learner is —**

1. Writing the symbols  $>$ ,  $<$ , and  $=$  to show the relationship of two quantities
2. Finding a missing addend in an addition sentence
3. Solving word problems involving a missing addend in an addition sentence

**in later chapters the learner will —**

Write the symbols  $>$ ,  $<$ , and  $=$  to show the relationship of two 2- or 3-digit numbers



# Notes & Things

In the real world, equality is less common than inequality. Perhaps the youngsters will appreciate this fact after simply looking around the classroom. Is the number of youngsters with brown eyes equal to the number of youngsters with blue eyes? Does the number of boys equal the number of girls? Does the amount of money you have equal the amount of money I have? There's no doubt we do need a way to compare two numbers in order to tell which is greater and which is less.

In level 1, the pupils made an arrowhead that pointed to the number that was less. That's where they will start in this level also. The arrowhead symbol is used first, then words are introduced to give meaning to the symbols, and finally the relation symbols  $<$  and  $>$  are introduced. No one

seems sure why children make mistakes such as  $10 > 11$ . Is it because they don't know the relationship of the two numbers or because they can't remember which symbol to use? Perhaps making the arrowhead point to the lesser number will help them understand the relationship better.

This chapter also features finding the missing addend. Very little work was done on finding a missing addend in level 1 for a good reason—it's a hard concept! The child needs to use the number line, and to find the answer he must *count* from the first number to the second number. Counting is an inefficient way to find an answer to any problem. The missing addend in this book is related to the concept of subtraction; it introduces the review of subtraction. The learner can find a missing addend quickly when subtraction is used.

This is a short chapter, but the learners still will be able to show off their good thinking. You'll all enjoy these pages.

## words

No new concept-development words are introduced in this chapter.

## things

wood cubes  
paper bag  
counters  
number line for each pupil

For the extra activities you will want to have tagboard cards available.

name \_\_\_\_\_

Write each set of numbers in order from least to greatest.

6	18	7	0	3	10
0	3	6	7	10	18
17	2	7	12	4	14
2	4	7	12	14	17
11	13	15	9	17	1
1	9	11	13	15	17

Make an arrowhead point to the number that is less.

$19 \rightarrow 18$

$1 \rightarrow 0$

$15 \leftarrow 16$

$16 \rightarrow 15$

$18 \leftarrow 19$

$0 \leftarrow 1$

lesson Pages 51, 52, 53

goal Review of order of numbers

**page 51** What does **least** mean? What does **greatest** mean? The words **least** and **greatest** are needed for this page because more than two numbers are compared. The words **less than** and **greater than** are the words that will deserve emphasis on the next pages as the relation symbols are introduced. Saves the intense vocabulary effort for tomorrow. When directions are clear, everyone works independently.

Do you need to review the notion of the arrowheads?



**goal** Introduction of the relation symbols  $>$  and  $<$

**page 52** Share the ideas on this page—new symbols can be troublesome. Focus on the stoplight. Talk about what it is used for and what the different colors of the lights mean. *Can you think of any other symbols we use every day?* (Road and safety signs, shaking hands, waving goodbye, a smile, and so on) *What are some signs we use in math?* Write the suggestions on the board. Read the last two lines on the page together. Be a ham—really play up the last question.

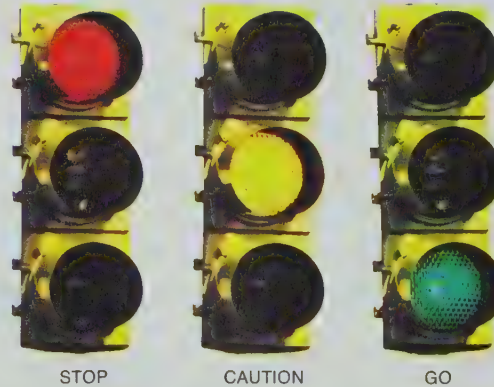
52

Use just the head of the arrow:  $<$  or  $>$ .

Make the arrowhead point to the number that is less.

10 $<$ 14	1 $<$ 9	8 $<$ 11	8 $>$ 6	10 $>$ 7	10 $>$ 0
6 $<$ 8	0 $<$ 15	17 $<$ 18	15 $>$ 5	7 $>$ 5	11 $>$ 10

Our world is full of symbols.



Mathematics has symbols too.

$$3 = 3$$

$$1 + 2 = 3$$

$$3 - 2 = 1$$

The heads of the arrow make math symbols too.  $<$   $>$   
What could they mean?

Answers will vary. Examples:

$<$  is less than

$>$  is more than

PURPOSE: Introduction to relation symbols.

name \_\_\_\_\_

The arrowhead  
always points to the  
number that is less.

But we need words  
to tell about  
the symbol.

$5 < 6$	$6 > 5$
<p>3 is less than 4</p> <p><math>3 &lt; 4</math></p> <p>The symbol <math>&lt;</math> can be used for the words "is less than."</p>	<p>4 is greater than 3</p> <p><math>4 &gt; 3</math></p> <p>The symbol <math>&gt;</math> can be used for the words "is greater than."</p>

Write the word  
in the blank.  
Write the symbol  
in the

<p>4 is <u>less</u> than 8</p> <p>4 <math>&lt;</math> 8</p>	<p>10 is <u>greater</u> than 1</p> <p>10 <math>&gt;</math> 1</p>
<p>12 is <u>greater</u> than 11</p> <p>12 <math>&gt;</math> 11</p>	<p>10 is <u>greater</u> than 4</p> <p>10 <math>&gt;</math> 4</p>

**goal** Practice in using the symbols  $>$  and  $<$

**page 53** This is an important page.  
There's much to talk about. Move one step  
at a time. Have the children practice each  
step on the board as you proceed. Then let  
them fill in the blanks on the page  
independently as a check for understanding.  
The results will tell you whether more  
discussion and practice are needed right now.

**goal** Practice in using the symbols  $>$  and  $<$

**things** for each pupil:  
number line (See page 128c.)

**warm-up** Each child will probably need his own number line to answer questions that involve the comparison of two numbers. For example:

- Does 18 come before or after 15?
- Is 18 greater than or less than 15?
- Does 7 come before or after 17?
- Is 7 greater than or less than 17?

**page 54** Discuss the display boxes. Emphasize that the tip of the arrowhead always points to the number that is less than the other, but the symbol has a special name. *What is the name?* Work the first row together. *Is 14 greater than or less than 10? The arrowhead must point to which number? Make the arrowhead point to the 10. How do you read that?* Have every sentence read as it is completed. As a pupil shows confidence, have him work independently. Save page 55 for another day **please.**

54

9 is greater than 4  
 $9 > 4$

4 is less than 9  
 $4 < 9$

Write  $>$  or  $<$  in each ring.

14  $>$  10

13  $<$  14

7  $>$  5

17  $>$  7

2  $<$  3

17  $>$  14

19  $<$  20

9  $<$  11

5  $<$  8

10  $<$  20

17  $>$  13

15  $<$  16

14  $>$  11

9  $>$  8

13  $<$  17

16  $>$  13

PURPOSE: Practice in using the symbols  $>$  and  $<$ .



See activity 1, page 64a.

name \_\_\_\_\_

Write  $>$  or  $<$   
in each ring.

$11 \bigcirc 12$

$12 \bigcirc 11$

$9 \bigcirc 10$

$10 \bigcirc 12$

$14 \bigcirc 16$

$18 \bigcirc 17$

$1 \bigcirc 2$

$1 \bigcirc 0$

$6 + 5 \bigcirc 12$

$14 \bigcirc 9 + 4$

$7 + 5 \bigcirc 13$

$8 + 2 \bigcirc 9$

$13 \bigcirc 8 + 6$

$9 + 6 \bigcirc 16$

$13 \bigcirc 6 + 8$

$18 \bigcirc 8 + 9$

$4 + 9 \bigcirc 14$

$16 \bigcirc 9 + 8$

$6 + 4 \bigcirc 11$

$14 \bigcirc 13$

$5 + 7 \bigcirc 14$

$8 + 3 \bigcirc 12$

$15 \bigcirc 17$

$7 + 4 \bigcirc 12$

**goal** Practice in using the symbols  $>$  and  $<$ **memo** Children frequently need a learning crutch to remember the **greater than** and **less than** symbols. Encourage the use of any type of memory aid. Maybe the children can think of a better one than the arrow.**page 55** Use this page to determine whether your pupils can use the **greater than** and **less than** symbols with confidence. Encourage anyone who is unsure to locate the numbers on the number line.



**goal** Application using comparison of numbers

**things** counters

**page 56** This problem situation lends itself to dramatization. Although only four children are directly involved, those in the audience will gain a better understanding of what's actually happening in the story. The illustration tells how many marbles each child has. Counters can be substituted for the real thing. Work together until you are sure your pupils understand. Prove some of the answers by matching counters.

56

Complete the English and the mathematical sentences.

Jim has 18 marbles.

Sally has 17 marbles.

Bill has 20 marbles.

Sue has 19 marbles.



Bill thinks: I have 20 marbles.	I have <u>more</u> than Sally.	20 $>$ 17
	I have <u>more</u> than Sue.	20 $>$ 19
	I have <u>more</u> than Jim.	20 $>$ 18
Sally thinks: I have 17 marbles.	I have <u>less</u> than Bill.	17 $<$ 20
	I have <u>less</u> than Sue.	17 $<$ 19
	I have <u>less</u> than Jim.	17 $<$ 18
Jim thinks: I have 18 marbles.	I have <u>less</u> than Bill.	18 $<$ 20
	I have <u>more</u> than Sally.	18 $>$ 17
	I have <u>less</u> than Sue.	18 $<$ 19

Who has the most marbles? Bill

PURPOSE: Applying the concepts "greater than" and "less than" in problem solving.

name \_\_\_\_\_

What number is missing? Complete.

Don has 4 model cars.

He wants to have 7.

How many more needed?  $4 + \textcircled{3} = 7$

5 cookies in a box.

8 people want one.

How many more needed?  $5 + \textcircled{3} = 8$

The class has 1 chicken.

They want to have 6.

How many more needed?  $1 + \textcircled{5} = 6$

Sally picked 4 flowers.

She wants to have 9.

How many more needed?  $4 + \textcircled{5} = 9$



**goal** Introduction to finding a missing addend

**memo** Some children may intuitively use subtraction to find a missing addend.

***That's great!*** However, many youngsters will look at missing addends as a hard kind of addition. Still others will solve this kind of problem by counting from a number to a number. Allow each pupil to use the method most efficient for him. The word **addend** need not be introduced to the children.

**things** wood cubes  
paper bag

**warm-up** Display 4 cubes. Place some additional cubes in the bag. *Here are 4 cubes. There are some more cubes in this bag. I want 7 cubes in all. How many cubes must I take from the bag?* Have a child count **from** 4, taking a cube from the bag each time he says a number—**5, 6, 7**. *How many did you take from the bag?* (3) *4 plus what number equals 7?*

**page 57** Work this page together. Continue the dramatization if necessary. Read the blank in each sentence as **what number**. For example:  $4 + \text{what number} = 7?$

**goal** Finding a missing addend

**things** counters

**page 58** Pupils who have a good grasp of what is happening should proceed independently.

Group the others and supply each pupil with a handful of counters. Focus on counting from the known addend to the sum and laying down a counter for each number spoken. In the first problem, count from 8—9, 10, 11, 12, 13, 14, 15. That's 7 counters and 7 is the missing number. Use this method and work the problems together.

58



What number is missing? Complete.

8 red stars.

15 papers get stars.

How many more needed?  $8 + \textcircled{7} = 15$

4 marbles.

13 players need one.

How many more needed?  $4 + \textcircled{9} = 13$

7 pieces of candy.

12 people want one.

How many more needed?  $7 + \textcircled{5} = 12$

Make up a story of your own for this picture.

$9 + \textcircled{2} = 11$

Answers will vary. Have students share stories.

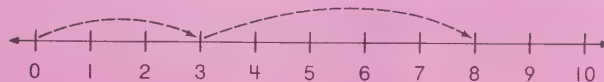
name \_\_\_\_\_

Fill in the blanks.

3 chairs.

8 people want to sit.

How many more chairs needed?

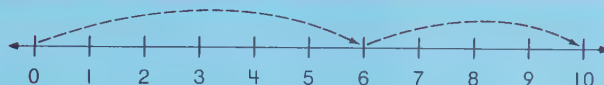


$$3 + \underline{5} = 8$$

6 tickets.

10 people want to go.

How many more tickets needed?

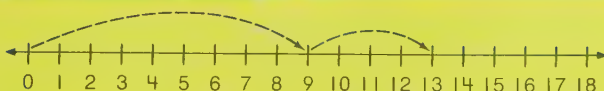


$$6 + \underline{4} = 10$$

9 hotdogs.

13 people want one.

How many more hotdogs needed?

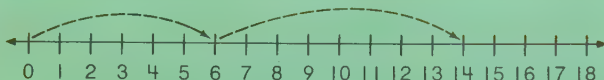


$$9 + \underline{4} = 13$$

6 books.

14 people want to read.

How many more books needed?



$$6 + \underline{8} = 14$$

**goal** Finding missing addends on the number line

**page 59** Work as a group. Have a child read the first sentence. *Trace the loop from zero to 3.* Have the next sentence read. *Trace the loop from 3 to 8.* Have the third sentence read. *Count the units from 3 to 8.* *How many? Fill in the blank in the sentence.* Have the completed addition sentence read.

Use the same procedure for the remainder of the page. Go on to page 60.



**goal** Practice in finding missing addends on the number line

**things** for each pupil:  
number line

**page 60** The addend arrows are not shown on these number lines. Pupils who have a good grasp of how to use the number line should be able to proceed independently. You may need to help some pupils with at least the first example. Encourage those who are unsure to use their individual number lines for the last four problems. Observe which children are able to solve these problems without an aid.

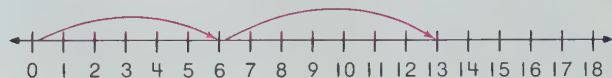
**NOTE:** These are real teeny, tiny cacti that grandma is putting into pots. The photograph matches the numbers in the second problem.

60

Show the addition on the number line.  
Complete the sentence.



I have 8. I want 17.  
How many more do I need?  $8 + 9 = 17$



I have 6. I want 13.  
How many more do I need?  $6 + 7 = 13$

You have 5.  
How many more to have 10?  $5$

He has 7.  
How many more to have 16?  $9$

She has 9.  
How many more to have 15?  $6$

We have 4.  
How many more to have 12?  $8$



**PURPOSE:** Extending addition.

name \_\_\_\_\_

# COMPLETE

## LOOK FOR PATTERNS

$$7 + \boxed{1} = 8$$

$$8 + \boxed{0} = 8$$

$$4 + \boxed{1} = 5$$

$$6 + \boxed{2} = 8$$

$$7 + \boxed{2} = 9$$

$$2 + \boxed{4} = 6$$

$$5 + \boxed{3} = 8$$

$$3 + \boxed{5} = 8$$

$$6 + \boxed{3} = 9$$

$$3 + \boxed{3} = 6$$

$$4 + \boxed{4} = 8$$

$$3 + \boxed{2} = 5$$

$$4 + \boxed{5} = 9$$

$$9 + \boxed{0} = 9$$

$$4 + \boxed{6} = 10$$

$$3 + \boxed{6} = 9$$

$$1 + \boxed{6} = 7$$

$$2 + \boxed{5} = 7$$

$$3 + \boxed{4} = 7$$

$$4 + \boxed{3} = 7$$

$$5 + \boxed{9} = 14$$

$$5 + \boxed{8} = 13$$

$$5 + \boxed{7} = 12$$

$$5 + \boxed{6} = 11$$

$$5 + \boxed{5} = 10$$

**goal** Practice in finding missing addends

**page 61** Some pupils can and should proceed independently. Work through most of the first column with the others. If anyone is really having a hard time, save part of the page for another day. Encourage the use of counters or the number line— whichever method works best for the individual.

Challenge some of the youngsters to prove their answers with counters.

***Be generous with praise*** when they are correct, and encourage them to find their own mistakes when they are wrong.

Examine the last column for patterns. Let the children describe the ones they see in their own words. Don't insist that anyone explain why a pattern occurs. It's sometimes hard to find the right words.

**goal** Practice in finding missing addends

**page 62** By now you know which pupils are capable of working independently. Encourage the others. Emphasize knowing a way to find the answer. Discourage wild guesses. Praise the youngsters who have discovered that they can find the missing addend by subtraction. **BUT** it is not necessary to teach this method now.

The child who has trouble with the problem at the bottom of the page should work with counters. With capable pupils you may choose to extend the problem by asking how many more each person needed, who needed the most, and who needed the least.

62

Complete.

$4 + \underline{8} = 12 \quad 9 + \underline{3} = 12 \quad 5 + \underline{5} = 10 \quad 8 + \underline{9} = 17$

$8 + \underline{3} = 11 \quad 6 + \underline{7} = 13 \quad 7 + \underline{8} = 15 \quad 9 + \underline{9} = 18$

$7 + \underline{6} = 13 \quad 8 + \underline{7} = 15 \quad 6 + \underline{9} = 15 \quad 4 + \underline{7} = 11$

$3 + \underline{9} = 12 \quad 5 + \underline{9} = 14 \quad 2 + \underline{9} = 11 \quad 9 + \underline{5} = 14$



Everyone  
needed 16.

Bill had 7.  
Sue had 9.  
Dick had 4.

Kim had 8.  
Dee had 5.  
Jane had 6.

Who had to find the most? Dick

Who had to find the least? Sue

PURPOSE: Addition practice.

name \_\_\_\_\_

Jan had 9 stamps.  
She had 17 letters.  
How many more  
stamps needed?



Karen made 9 belts.  
She needs to make 18.  
How many more  
to make?



Bill walked 9 blocks.  
He had to go 13 blocks.  
How many more  
blocks to go?



Jim sold 7 tickets.  
He wants to sell 10.  
How many more  
to sell?



You complete the problem  
and find the answer.

Words in blank will vary. One example  
for each is given within parentheses.

\_\_\_\_\_ (Ann) fried 8 \_\_\_\_\_ (doughnuts) .

12 \_\_\_\_\_ (children) wanted one.

How many more \_\_\_\_\_ (doughnuts) to be fried? \_\_\_\_\_ 4

\_\_\_\_\_ (Ned) needed 12 \_\_\_\_\_ (brushes) .

There were only 9.

How many more \_\_\_\_\_ (brushes) needed? \_\_\_\_\_ 3

There were 8 \_\_\_\_\_ (books) on the \_\_\_\_\_ (table) .

15 \_\_\_\_\_ (children) had to have one.

How many more \_\_\_\_\_ (books) to be found? \_\_\_\_\_ 7

**goal** Solving word problems involving a missing addend

**page 63** Do the problems in the left-hand box first. Read the problems. There are more word clues again. Use a number line or counters if necessary.

Anything goes in completing the story on the right side of the page. People's names need to be added as well as names of objects. The youngsters will enjoy sharing their completed stories.



**goal Checkout**—ability to use the relation symbols  $>$ ,  $<$ , and  $=$

**warm-up** Write these sentences on the chalkboard.

$$5 > 12 \quad 6 + 3 > 10 \quad 8 < 4 + 4$$

Is the first sentence correct? (No) How can we correct it? You may be surprised by the pupils' many good ideas. If no one thinks of it, suggest crossing out the wrong symbol and writing the correct symbol above:

$$5 \overset{<}{\cancel{>}} 12$$

Examine the remaining sentences.

Now write the following on the board:

$$5 + 3 \bigcirc 10 \quad 11 \bigcirc 5 + 5$$

Point to the first sentence. *What symbol will make this sentence right?* Have a child complete the sentence. Repeat for the second sentence.

**page 64** Talk about the pictures and directions at the top of the page. Everyone will want to show how smart he is! After the warm-up, directions should be no problem. Watch for reversed **greater than** and **less than** symbols. *The point of the arrowhead must always point to which number?* Keep nagging if necessary.

64



Here is  
He made some mistakes.  
Find the mistakes.  
Make them right.

$$0 < 10$$

$$5 + 4 \overset{<}{\cancel{>}} 10$$

$$20 \overset{<}{\cancel{>}} 21$$

$$14 \overset{<}{\cancel{>}} 7 + 8$$

$$31 \overset{>}{\cancel{<}} 13$$

$$14 = 7 + 7$$

PURPOSE: Checkout—relation symbols.



Here is  
another paper to check.  
Find the mistakes.  
Make them right.

$$12 \overset{>}{\cancel{<}} 11$$

$$7 + 8 \overset{=}{\cancel{>}} 15$$

$$9 \overset{<}{\cancel{>}} 12$$

$$8 + 9 \overset{>}{\cancel{<}} 16$$

$$6 + 9 \overset{<}{\cancel{>}} 16$$

$$13 = 8 + 5$$



Now it is your turn.  
You won't make  
any mistakes.

$$5 + 9 \bigcirc 14$$

$$16 \bigcirc 7 + 6$$

$$9 \bigcirc 3 + 6$$

$$3 + 4 \bigcirc 8$$

$$7 + 5 \bigcirc 12$$

$$11 \bigcirc 6 + 6$$



See activity 2, page 64a.



See activity 3, page 64a.

# RESOURCES

## another form of evaluation

for checkout—page 64

Find the mistakes. Make them right.

$$\begin{array}{lll} 3 < 8 & 12 > 21 < & 56 < 67 \\ 3 + 8 = 11 & 13 < 6 + 7 = & 16 > 8 + 5 \\ 6 \text{ is less than } 7 & 24 < 42 & 3 + 8 > 10 \\ 6 \otimes 7 < & & \\ 4 + 7 \neq 10 > & 16 \nless 7 + 8 > & 15 = 7 + 8 \end{array}$$

Now it is your turn. You won't make any mistakes.

$$\begin{array}{lll} 12 \ominus 5 + 7 & 8 + 7 \oslash 13 & 16 \ominus 9 + 7 \\ 9 + 5 \leq 15 & 12 \leq 7 + 9 & 6 + 8 \ominus 14 \end{array}$$

## activities

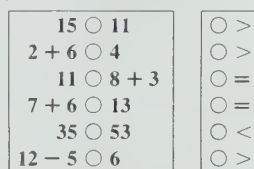
### 1. things slips of paper

This game focuses on number relationships. Select someone to **think** of a number not greater than 20 and write it on a slip of paper. This paper is given to the **judge** for safekeeping—and to verify that the answers are correct. The object is to guess the number by asking the **thinker** questions that he can answer yes or no. For example: *Is the number more than 10? Is it less than 17?* The person who guesses the number

gets to be the thinker of the next number. The judge also tallies each question asked. If the group cannot guess the number after 5 questions, the thinker selects another number.

### 2. things tagboard cards, felt pen

Prepare several cards as shown. Cut out the circle in which the relation symbol should be written. Turn the card over and write the correct symbol next to the hole.



The pupil places the card on top of a piece of paper and makes the correct relation symbol inside the hole. To check, the card is turned over and placed so that the pupil's answers show through the hole. Cards may be exchanged for additional practice.

### 3. things small cards

Each group needs a set of numeral cards 0 through 50. The cards are shuffled and the same number of cards is dealt facedown to each player. Extra cards are set aside. The players place their cards in a stack facedown before them. The dealer decides whether to play for the greatest or the least number. All players turn over their top cards. If the dealer has decided greatest number, the player with the card showing the greatest number takes all the played cards. Play continues until all the cards are used. The player taking the most cards wins and becomes the new dealer.

## additional learning aids

**concept**—chapter objective 1

**SRA products**

*Computapes*, SRA (1972)  
Module 1, Lesson: AS 10  
*Inquisitive Games: Exploring Numbers and Space*, SRA (1967)  
Animal Toss Game  
Land and Water Animals Game  
*Mathematics Involvement Program*, SRA (1971)  
Cards: 62, 332, 123

**other learning aids** (described on page 128f)—  
Inset Shapes Board (set A), Keyboard  
Counter, 100 Number Board

**operation**—chapter objectives 2 and 3

**SRA products**

*Arithmetic Fact Kit*, SRA (1969)  
Addition cards: 24, 25  
Subtraction cards: 21, 22  
*Computapes*, SRA (1972)  
Module 1, Lesson: AS 11  
Module 2, Lessons: AS 28, 29  
*Skill through Patterns, level 2*, SRA (1974)  
Spirit masters: 9, 10, 15

**other learning aids**—Cuisenaire Rods, Match  
It Game, Tally and Difference

Make a copy of these.

$\begin{array}{r} 18 \\ \underline{9} \end{array}$	$\begin{array}{r} 17 \\ \underline{9} \end{array}$	$\begin{array}{r} 17 \\ \underline{8} \end{array}$	$\begin{array}{r} 16 \\ \underline{9} \end{array}$	$\begin{array}{r} 16 \\ \underline{8} \end{array}$	$\begin{array}{r} 16 \\ \underline{7} \end{array}$	$\begin{array}{r} 15 \\ \underline{9} \end{array}$	$\begin{array}{r} 15 \\ \underline{8} \end{array}$	$\begin{array}{r} 15 \\ \underline{7} \end{array}$
$\begin{array}{r} 15 \\ \underline{6} \end{array}$	$\begin{array}{r} 14 \\ \underline{9} \end{array}$	$\begin{array}{r} 14 \\ \underline{8} \end{array}$	$\begin{array}{r} 14 \\ \underline{7} \end{array}$	$\begin{array}{r} 14 \\ \underline{6} \end{array}$	$\begin{array}{r} 13 \\ \underline{9} \end{array}$	$\begin{array}{r} 13 \\ \underline{8} \end{array}$	$\begin{array}{r} 13 \\ \underline{7} \end{array}$	$\begin{array}{r} 13 \\ \underline{6} \end{array}$
$\begin{array}{r} 13 \\ \underline{5} \end{array}$	$\begin{array}{r} 13 \\ \underline{4} \end{array}$	$\begin{array}{r} 12 \\ \underline{9} \end{array}$	$\begin{array}{r} 12 \\ \underline{8} \end{array}$	$\begin{array}{r} 12 \\ \underline{7} \end{array}$	$\begin{array}{r} 12 \\ \underline{6} \end{array}$	$\begin{array}{r} 12 \\ \underline{5} \end{array}$	$\begin{array}{r} 12 \\ \underline{4} \end{array}$	$\begin{array}{r} 12 \\ \underline{3} \end{array}$
$\begin{array}{r} 11 \\ \underline{9} \end{array}$	$\begin{array}{r} 11 \\ \underline{8} \end{array}$	$\begin{array}{r} 11 \\ \underline{7} \end{array}$	$\begin{array}{r} 11 \\ \underline{6} \end{array}$	$\begin{array}{r} 11 \\ \underline{5} \end{array}$	$\begin{array}{r} 11 \\ \underline{4} \end{array}$	$\begin{array}{r} 11 \\ \underline{3} \end{array}$	$\begin{array}{r} 11 \\ \underline{2} \end{array}$	$\begin{array}{r} 11 \\ \underline{1} \end{array}$

# 3

## ADDING AND SUBTRACTING MULTIPLES OF 10

before this chapter the learner has —

1. Counted, said, written, and ordered the numbers 0 through 99
2. Mastered saying and writing the sum for an addition fact
3. Mastered saying and writing the difference for a subtraction fact
4. Shown addition and subtraction on the number line
5. Used the symbols  $>$ ,  $<$ , and  $=$  to record the comparison of two numbers

in chapter 3 the learner is —

1. Learning about place value and order for numbers less than 200
2. Adding multiples of 10 with sums less than 190
3. Subtracting multiples of 10 with numbers less than 190

in later chapters the learner will —

1. Count, say, and write the number of members in a set having as many as 999 members
2. Write or say the numbers that are between any two numbers less than 1000
3. Compare any two numbers less than 1000
4. Tell how many hundreds, tens, and ones are represented in any 3-digit number
5. Find the sum or difference for any two 2-digit numbers



# Notes & Things

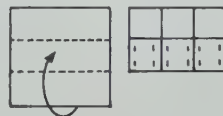
Get out the ten-trays. They will really be used in this first chapter on place value. In fact get anything out of the cupboard that may help the youngsters get the idea of groups of tens—bundles of tongue depressors, beads, strings of paper clips, hundred boards—anything and everything.

This program does not emphasize the distinction between numeral and number, but in this chapter the youngsters should come to understand that our 10 digits—0, 1, 2, 3, 4, 5, 6, 7, 8, and 9—are quite wonderful symbols. One can rearrange them in all sorts of ways and be able to write the answer to the question “How many?” It doesn’t take long for the children to get tired of counting by ones. The notion of putting objects together in sets of ten makes sense to everyone. But be careful—don’t move too quickly. It takes a long time to convince some children that if you fill a ten-tray with ten objects and put it down for a minute, all ten objects are still in place when you pick the tray up again. You’ll be surprised at how many youngsters will want to count again just to make sure. Please take the time necessary to do this step or you’ll never convince

them that they can count by tens. (No fair counting by rote at this point or the concept of place value will never be understood!)

If the children can meaningfully count by tens, they’ll have no trouble at all adding and subtracting multiples of ten. You will find place-value headings used throughout this book and throughout the program. The youngsters will discover that addition and subtraction operations are a snap if they know just their number facts and a little bit about the place value of each digit.

You will certainly want to have a set of numeral cards and a place-value pocket chart for every child. The charts are so easy to put together that the youngsters can probably make their own. You will find a pattern below. Use heavy paper, have a stapler available, and let everyone go about the business of learning about our number system.



## words

The only new concept-development word used orally and appearing on the pupil page is *array*.

## things

counters

egg cartons with 2 cups cut off an end to form ten-trays

groups of 10 and 100 counters

for each pupil: ten-tray, 2 rubber bands, place-value chart, numeral cards

For the extra activities you will want to have these things available:

spirit master of numerals

oaktag

yarn or string

number line from 0 through 100

tagboard cards

snap clothespins and clothesline

wood cubes

large piece of oilcloth or plastic


tongue depressors

white milk glue

dried beans

name \_\_\_\_\_

Complete  
the table.

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99
100	 Color the column on the left yellow. Look at the numerals in this column. Do you see a pattern? <small>The digit in the ones column is always 0. There are always zero ones.</small>								

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PURPOSE: Counting to 99—readiness for place value.

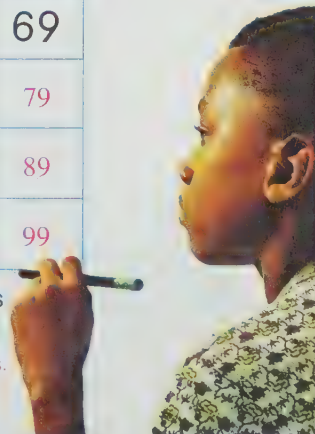


**things** spirit master

Prepare a stencil by writing the numerals 1 through 100 at random over the entire page. Write one numeral twice. Have the pupils hunt for the double numeral by finding each number in order and crossing it out.

Have them make a ring around the double when the pair is found.

Variation: Leave one number greater than the double off the spirit master. After the double is found, have the pupils hunt for the missing numeral and write it in.



**goal** Readiness for place value

**things** 100 counters  
container

**warm-up** Count aloud as a group. Count 100 objects, one by one, as the objects are dropped into a container.

Have a child circulate and tap each child while everyone counts aloud the number of children in the room.

If more practice is needed, count the number of books on a shelf, the number of chairs, the number of pencils, and so on. Each time count real objects.

**page 65** Guide the children with three kinds of questions as they complete the table:

- What number comes **between** 2 and 4?
- What number comes **before** 33?
- What number comes **after** 61?

When the table is complete, direct the children:

- Ring the number that tells how many children are in the room.
- Ring the number that tells how old you are.
- Ring the number that tells how many are in your family.
- Count aloud from 58 to 80.
- Find 0. Read all the numbers in this column.

Follow the directions at the bottom of the page. Talk about the pattern(s) the children see.

**goal** Readiness for place value

**memo** Pupils who have completed level 1 of this program will already be familiar with ten-trays.

**things** for each pupil:  
ten-tray  
18 counters, 9 each of 2 colors

**warm-up** Each child should work with his own tray and counters. *Put 6 counters of the same color in your tray. Put 5 more counters of another color in your tray. How many counters in the tray? How many ten-trays did you fill? Did any counters not fit? How many?* Continue with more examples until everyone is working with ease.

**page 66** Work the page with ten-trays and counters. The children should fill their own trays before filling in the page. Guide them with *How many tens? How many ones?* as they fill in the blanks.

66

Can you  
fit them  
in a ten-tray  
If you have —

6 and 5 more?  
Do any not fit?



1 ten 1 ones

8 and 4 more?  
Do any not fit?



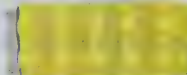
1 ten 2 ones

7 and 6 more?  
Do any not fit?



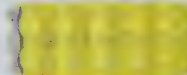
1 ten 3 ones

3 and 8 more?  
Do any not fit?



1 ten 1 ones

4 and 7 more?  
Do any not fit?



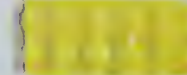
1 ten 1 ones

9 and 8 more?  
Do any not fit?



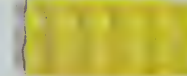
1 ten 7 ones

5 and 8 more?  
Do any not fit?



1 ten 3 ones

6 and 9 more?  
Do any not fit?

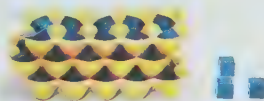
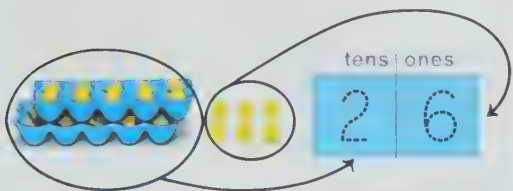


1 ten 5 ones

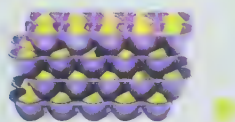
PURPOSE: Readiness for place value.

name \_\_\_\_\_

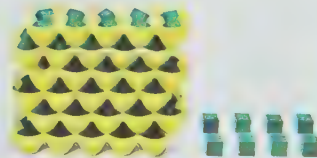
How many tens? How many ones?



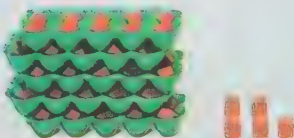
tens	ones
3	3



tens	ones
4	1



tens	ones
6	8



tens	ones
5	6



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PURPOSE: Showing tens and ones.

**goal** Recording the number of tens, the number of ones

**memo** The focus is on place value. Although the number of tens is written alongside the number of ones, the notation on this page should be read as **two tens—six ones**, not as twenty-six. Avoid using the word **and** between the tens and ones. **And** is reserved for reading a decimal point.

**things** ten-trays  
counters

**page 67** Group the youngsters. Provide each group with enough ten-trays and counters so that they can reproduce the pictures on the page with the real thing.

Look at the first picture. Show everyone two full trays, one stacked on top of the other, and assure the youngsters that the trays in the picture are full too. Have each group match each picture by building the same number of ten-trays and the same number of extra counters as they work the page. Recording how many should be the last stop for each problem.



See activity 1, page 92a.



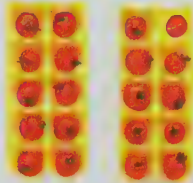
**goal** Finding the number that comes after a 2-digit number

**memo** Have your pupils duplicate what's shown in the pictures on the page with trays and counters if necessary.

**page 68** Begin by having the children count and record the number of tens and ones under the "How many?" column. *One ten, nine ones. What number is that? The directions say to add one more. Where will we add it? Complete the "Add one more" column. Two tens, zero ones. What number is that? Look at the sentences alongside the pictures. These sentences ask you to remember what happened. Have the sentences completed and read.*

Let the children who are confident finish the page by themselves while you work with the others.

68



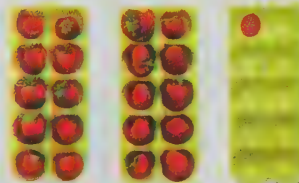
There were 19.  
You added one more.

How many? Add one more.

tens	ones
1	9

tens	ones
2	0

Now there are 20.



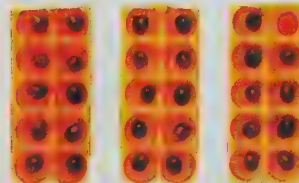
There were 20.  
You added one more.

How many? Add one more.

tens	ones
2	0

tens	ones
2	1

Now there are 21.



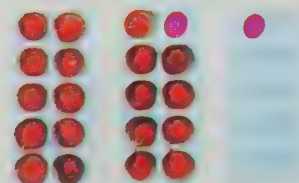
There were 29.  
You added one more.

How many? Add one more.

tens	ones
2	9

tens	ones
3	0

Now there are 30.



There were 19.  
You added two more.

How many? Add two more.

tens	ones
1	9

tens	ones
2	1

Now there are 21.

PURPOSE: Showing tens and ones.

name \_\_\_\_\_

Write one, two, and three more.

one more

two more

three more



tens	ones
1	8

tens	ones
1	9

tens	ones
2	0

tens	ones
2	1

tens	ones
4	9

tens	ones
5	0

tens	ones
5	1

tens	ones
5	2

tens	ones
5	8

tens	ones
5	9

tens	ones
6	0

tens	ones
6	1

tens	ones
2	9

tens	ones
3	0

tens	ones
3	1

tens	ones
3	2

tens	ones
7	9

tens	ones
8	0

tens	ones
8	1

tens	ones
8	2

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PURPOSE: Practice with place value.

**goal** Development of order for 2-digit numbers

**warm-up** Line up ten children. As you tap a child, he holds up all the fingers on both hands. Everyone counts aloud—10, 20, 30, and so on.

**page 69** Work the first two rows together. You may want some children to show the number given and the addition of one more, two more, and so on, with ten-trays and counters. Let everyone complete the page independently. Any child who makes more than one mistake needs your supervision because more practice with manipulatives is in order.



See activity 2, page 92a.

**goal** Writing ten more for 2-digit numbers

**memo:** If you have some favorite way to show sets of 10, now is the time to bring out these materials. For example: bundles of toothpicks, tongue depressors, straws, colored sticks, cubes that fasten together, rod with units marked. Or you may choose to continue with ten-trays and counters.

**things** full ten-trays  
for each pupil:  
10 bundles of 10  
loose counters

**warm-up** Display a full tray. *How many?* Stack another full tray on top. *How many?* (2 tens, or 20) Stack another full tray on top. *Let's count by tens to find how many.*

Have the children use their manipulatives to count by tens to 60. If you don't have enough materials, have the children work in pairs. *Show three more. How many?* (63) *Add one ten more. How many?* (73) Continue with the manipulatives and go right to the page.

**page 70** Have the children reproduce each problem with manipulatives as long as is necessary to develop understanding and confidence.



PURPOSE: Practice with place value.

ten more

tens	ones
3	4

tens	ones
4	4

tens	ones
7	1

tens	ones
8	1

tens	ones
5	0

tens	ones
6	0

tens	ones
6	9

tens	ones
7	9

tens	ones
2	4

tens	ones
3	4

tens	ones
4	8

tens	ones
5	8

ten more

tens	ones
6	7

tens	ones
7	7

tens	ones
7	5

tens	ones
8	5

tens	ones
1	8

tens	ones
2	8

tens	ones
5	9

tens	ones
6	9

tens	ones
8	1

tens	ones
9	1

tens	ones
6	0

tens	ones
7	0



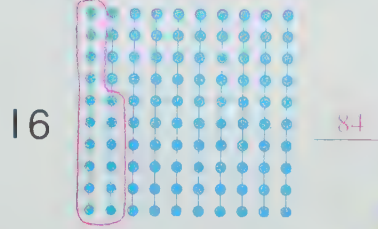
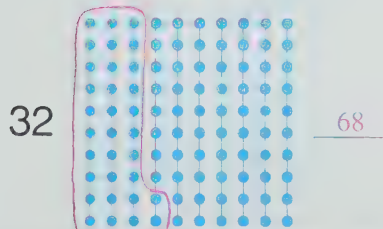
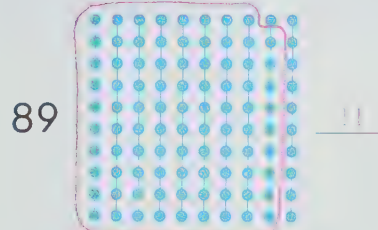
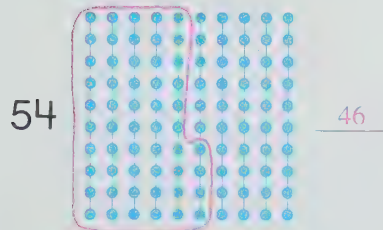
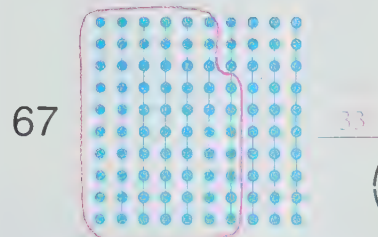
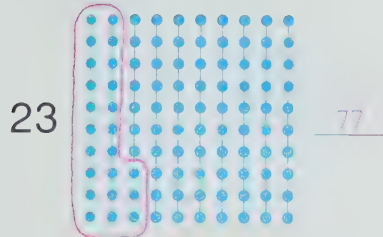
**things** ten-trays, counters

Pupils work in pairs. One pupil selects a 2-digit number and asks the other pupil to show the number with trays and counters. If he can do this correctly, he then thinks of a number for the first child to show.

If he makes an error, the first child gives him a different number to show. When the youngsters can perform this task successfully, extend it as follows: *Show 42. What number is 1 ten more? 1 ten less? What number is 1 more? 1 less?*

name \_\_\_\_\_

Draw a ring around the number of dots shown.  
How many are not in the ring?



**goal** Recording how many in sets less than 100

**page 71** *How many beads in the first string? Are there as many in the second string? in every string? Some children will count a few strings of beads to be sure; others will be able to tell by looking. Can we count the beads by tens? Let's count to find how many in the first picture. (100) Establish how many beads are in each picture.*

Work at least two problems together. Lead the children to count by tens first, then count by ones. For example: 10, 20, 1, 2, 3. Pupils who are capable should go on independently while you work with the others.

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PURPOSE: Practice with place value.



See activity 3, page 92a.



**goal** Introduction to writing 100

**things** 9 groups of 10 counters  
10 loose counters

**page 72** Look at the first group. How many tens? Write how many. How many ones? Write how many. How many all together? Write how many. Repeat the directions for the next two problems. Talk about 100 as another name for 10 tens.

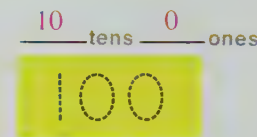
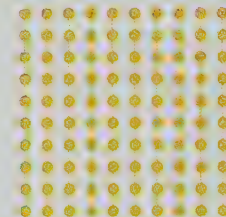
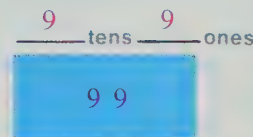
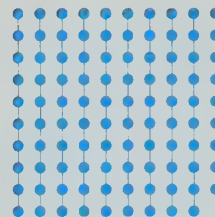
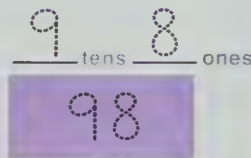
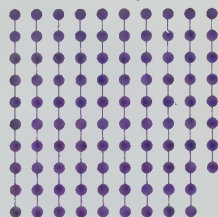
The children may not know that an ARRAY must have the same number in each row and the same number in each column. Look at the bead picture for 98. Does every row have the same number of beads? (No) What about the picture for 99? (No) for 100? (Yes) When we have a picture of rows of objects and every row has the same number, then that picture has a special name. It is called an ARRAY. When the array is complete, ask: How many in each row? (Rows go across.)

How many in each column? (Columns go down.) Is this an array? How many dots in the array?

Show 96 with manipulatives. How many? Count together. That number is already shown on the number line. Add one more counter. What number is one more than 96? Write it in the box next to 96. Add another counter. Count. Continue until 100 is developed as 99 and one more. Do you think there are numbers more than 100? Just wonder. Don't prove it now.

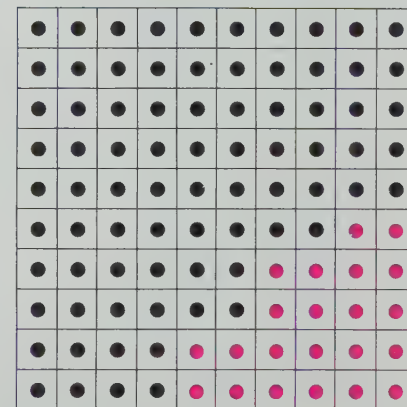
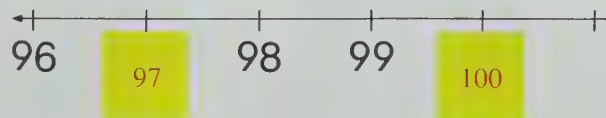
72

Write how many.



Complete the array.

How many? 100



PURPOSE: Introduction to 100.



**things** small cards

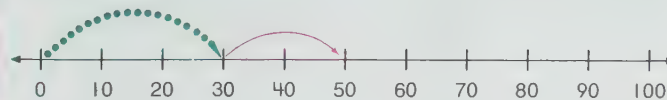
Each group will need a set of 2-digit numeral cards. Only 3 cards are dealt to a player at a time. The player arranges the 3 numbers in order from least to greatest.

One point is scored if this is done correctly, two points if someone catches an error and corrects it.

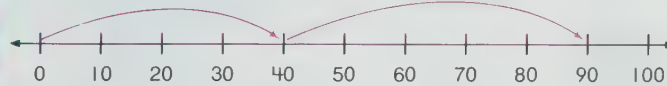
name \_\_\_\_\_

Show the addition on the number line.  
Complete the sentence.

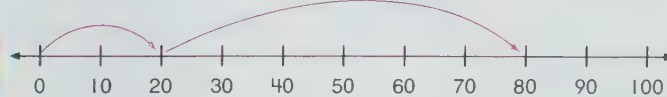
$30 + 20 =$



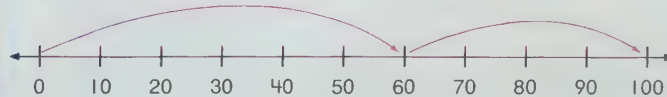
$40 + 50 =$



$20 + 60 =$



$60 + 40 =$



**goal** Introduction to addition of two multiples of 10

**memo** This will be the pupils' first experience using a number line showing multiples of a number without the ones marked between. **LOOK OUT!**

**warm-up** Draw four number-line models on the chalkboard, each showing 0 through 10. Have a child show each of these sentences on one of the models:  $2 + 3$  and  $5 + 4$ . *Don't let me trick you. Watch carefully.* Annex a zero to the numbers 1 through 10 on the remaining models. Read the new numbers together. *Does this change the kind of numbers you can add on the number line?* If your pupils can give you examples, use them. Otherwise, challenge someone to show  $20 + 30$  and another person to show  $50 + 40$ .

*Could you show 17 plus 24 on this line? If you get a yes, ask how.* Give much praise to any child who suggests that each unit of ten could be subdivided to show ones.

**page 73** *What will you do on this page?* Most youngsters should be able to work independently. Check by having the completed sentence read. Disagree with at least one answer so that it must be proven on the number line.

**goal** Practice in adding two multiples of 10.

**warm-up** Show this new notation on the chalkboard.

tens | ones

How would you write 20 using this? Have a child demonstrate. Why did you write 2 under the word **tens**? zero under the word **ones**?

I want to add 10 to this 20. Could you write that? Now can you show how many in all?

It may take some experimenting and a lot of thinking, but try to get the correct way from the children. Question **why** everything is done as it is.

**page 74** Work the top row together. Use full ten-trays and count aloud if necessary. Ask someone to read the first problem in the second row aloud. *Haven't we just done that problem? Where?* (Row above) Go on to the next problem. Be a ham—I know I've done that problem before! Does anyone already know what the next answer will be? Some pupils will be ready to go on independently. Keep working with the others.

74

**Fill in the missing numbers.**

tens | ones  
4 | 0

Add 1 ten

tens | ones  
5 | 0

Add 2 tens

tens | ones  
6 | 0

Add 3 tens

tens | ones  
7 | 0

tens | ones  
4 | 0  
+ 1 | 0

5 | 0

tens | ones  
4 | 0  
+ 2 | 0

6 | 0

tens | ones  
4 | 0  
+ 3 | 0

7 | 0

Add 1 ten

tens | ones  
5 | 0

tens | ones  
6 | 0

Add 3 tens

tens | ones  
8 | 0

Add 5 tens

tens | ones  
10 | 0

tens | ones  
5 | 0  
+ 1 | 0

6 | 0

tens | ones  
5 | 0  
+ 3 | 0

8 | 0

tens | ones  
5 | 0  
+ 5 | 0

10 | 0



PURPOSE: Practice in adding multiples of ten.

name \_\_\_\_\_

**add**

$$\begin{array}{r} 50 \\ + 10 \\ \hline 60 \end{array}$$

$$\begin{array}{r} 50 \\ + 20 \\ \hline 70 \end{array}$$

$$\begin{array}{r} 50 \\ + 30 \\ \hline 80 \end{array}$$

$$\begin{array}{r} 50 \\ + 40 \\ \hline 90 \end{array}$$

$$\begin{array}{r} 50 \\ + 50 \\ \hline 100 \end{array}$$

$$\begin{array}{r} 60 \\ + 10 \\ \hline 70 \end{array}$$

$$\begin{array}{r} 60 \\ + 20 \\ \hline 80 \end{array}$$

$$\begin{array}{r} 60 \\ + 30 \\ \hline 90 \end{array}$$

$$\begin{array}{r} 60 \\ + 40 \\ \hline 100 \end{array}$$

$$\begin{array}{r} 70 \\ + 10 \\ \hline 80 \end{array}$$

$$\begin{array}{r} 70 \\ + 20 \\ \hline 90 \end{array}$$

$$\begin{array}{r} 70 \\ + 30 \\ \hline 100 \end{array}$$

$$\begin{array}{r} 80 \\ + 10 \\ \hline 90 \end{array}$$

$$\begin{array}{r} 80 \\ + 20 \\ \hline 100 \end{array}$$

$$\begin{array}{r} 90 \\ + 10 \\ \hline 100 \end{array}$$



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PURPOSE: Progress check—adding multiples of ten.

**goal Progress Check**—adding two multiples of 10.

**warm-up** Write on the board:

tens	ones
40	
+ 20	
<hr/>	

Have someone complete the problem and explain what he did.

*You're so smart! Now try it without the reminders.* Erase the words **tens**, **ones**, and the line. Leave the actual computation on the board. Challenge four youngsters to do these problems:

20	30	50	90
+ 20	+ 60	+ 40	+ 10

Have each child who does a problem explain what he is doing and why.

**page 75** Any questions about how to do this page? All Progress Checks are to be completed independently. Examine any errors.

- Does the child know the facts?
- Has the removal of the words and line caused trouble?

After the problems are corrected, look for patterns. Have someone read the answers in the first row aloud. Have the next two rows of answers read aloud. Has anyone caught on yet? Have someone read aloud the answers on the diagonal (upper left to lower right). Go on to the next diagonal line. Another surprise!



See activity 4, page 92b.



See activity 5, page 92b.



**goal** Practice in adding two multiples of 10; review of order of numbers

**page 76** The concepts and skills developed so far are reviewed on this page. After directions are clear, everyone should be able to work independently. Take advantage of this opportunity to encourage anyone who is plodding along and needs a little special help.

76

Does the sum equal 100?  
Then draw a line.

$$90 + 10$$

$$50 + 50$$

$$30 + 70$$

$$80 + 20$$



$$100 + 0$$

$$10 + 80$$

$$40 + 50$$

$$60 + 40$$

What number comes  
before and after?

0	1	2	9	10	11
74	75	76	27	28	29
28	29	30	50	51	52
59	60	61	98	99	100

What numbers are missing?

17	18	19	20	21	22
59	60	61	62	63	64
95	96	97	98	99	100

PURPOSE: Review of the order of numbers and addition.



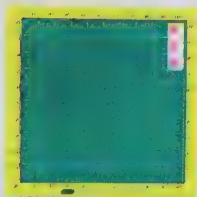
See activity 6, page 92b.



Extend activity 1, page 64a, to numbers not greater than 100. Because of the many possibilities, allow 20 questions rather than just 5.

name \_\_\_\_\_

Fill in the blanks.

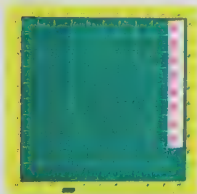


How many? 97

Add 3.

Now how many? 100

hundreds	tens	ones
1	0	0

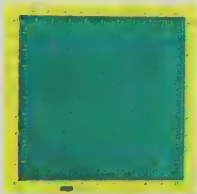


How many? 92

Add 8.

Now how many? 100

hundreds	tens	ones
1	0	0

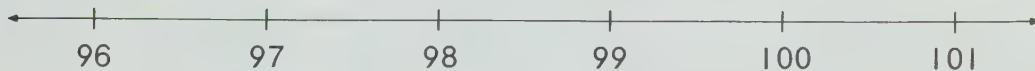


How many? 100

Add 1.

Now how many? 101

hundreds	tens	ones
1	0	1



**goal** Introduction of the hundreds place-value position

**things** for each pupil:  
9 bundles of 10  
10 single counters  
2 rubber bands

**warm-up** Show 9 tens. Show 6 ones. Add 4 more ones. How many ones? (10) Can you make another ten? Do it.

How many tens? (10) Count by 10 to find how many in all. One hundred is a very special number. How can we show that it's special? Lead the youngsters to suggest putting a rubber band around the 10 tens. Who can write how many?

**page 77** Work with the youngsters. Have them count and record how many, then shade in squares to show the number to be added, and finally tell how many now. Focus on the place-value chart. How many hundreds? Write how many. How many tens? How many ones? The child who answers 10 tens or 100 ones is not wrong. Rather, he has a good grasp of place value. Just ask him if there are any more tens or ones beside the array of 100.

When the blanks are all filled in, recall the number line on page 72. We had a mark on the line with no number. Now that mark has a number. Have someone read it aloud.

**goal** Introduction to the numbers 101 through 109

**memo** Each child will need his own place-value chart. See Notes and Things, page 64d of this guide for directions. Have each person trace over each position name on his chart with a crayon of a different color.

**things** groups of 100 counters  
9 loose counters  
for each pupil:  
place-value chart (See page 64d)  
numeral cards

**warm-up** Display a group of 100 and some loose ones (1 through 9) with some kind of manipulative you have available. Emphasize having a group of one hundred and some loose ones, but no loose tens. Have the children show how many in their place-value charts. Repeat until all the numbers 101 through 109 have been formed.


**page 78** If the pictures seem too abstract for some children, have them work with manipulatives. Gently nag about writing the numbers in straight columns. After finishing the problems, focus on the number line. *What number comes after one hundred two? What numbers are between one hundred one and one hundred five? What number comes after one hundred eight? Which is less—one hundred six or one hundred?*

78

Write how many.




$$\begin{array}{r} 100 \\ + \quad 1 \text{ more} \\ \hline 101 \end{array}$$




$$\begin{array}{r} 100 \\ + \quad 2 \text{ more} \\ \hline 102 \end{array}$$




$$\begin{array}{r} 100 \\ + \quad 3 \text{ more} \\ \hline 103 \end{array}$$




$$\begin{array}{r} 100 \\ + \quad 4 \text{ more} \\ \hline 104 \end{array}$$



$$\begin{array}{r} 100 \\ + \quad 5 \text{ more} \\ \hline 105 \end{array}$$



$$\begin{array}{r} 100 \\ + \quad 6 \text{ more} \\ \hline 106 \end{array}$$



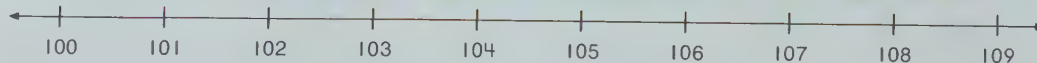
$$\begin{array}{r} 100 \\ + \quad 7 \text{ more} \\ \hline 107 \end{array}$$



$$\begin{array}{r} 100 \\ + \quad 8 \text{ more} \\ \hline 108 \end{array}$$



$$\begin{array}{r} 100 \\ + \quad 9 \text{ more} \\ \hline 109 \end{array}$$

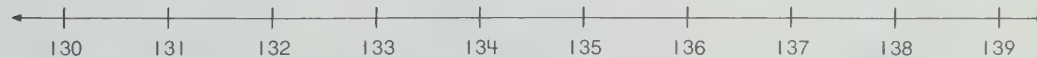
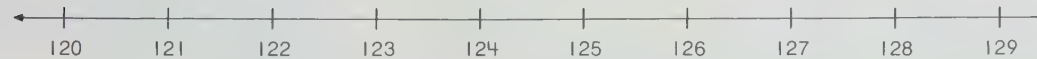
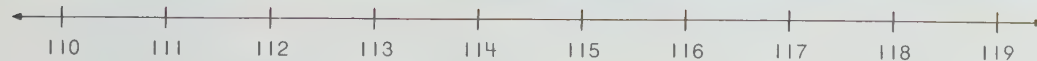
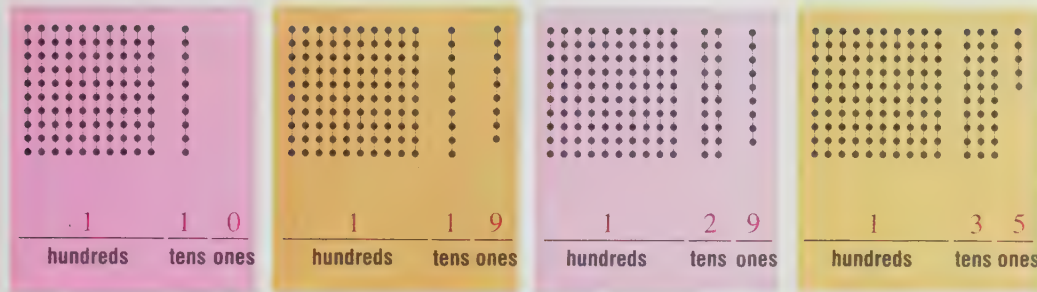


PURPOSE: Introduction to 101 through 109.



name \_\_\_\_\_

Fill in the blanks.



## lesson Pages 79, 80

**goal** Introduction to numbers larger than 109

**memo** Writing three nonzero digits in the three place-value positions introduced so far will be a new experience for your pupils.

**things** counters:  
 1 group of 100  
 3 groups of 10  
 9 loose  
 for each pupil:  
 place-value chart  
 numeral cards

**warm-up** Display a group of 100. *Show how many in your chart.* Add a group of 10 to the display. *Who can show this number?* Add 3 loose counters to the display. *Show how many now.* Add 1 more ten to the display and have the children show the number in their place-value charts. Continue to change the display, showing numbers less than 150.

**page 79** After the warm-up, the top row of problems should be easy. If not—more practice with manipulatives and place-value charts.

Challenge the youngsters to find patterns on the number-line models. Look across as well as up and down. Ask “before,” “after,” and “between” questions. Stress reading 114 as one hundred fourteen **not** one hundred and fourteen. Remember that **and** is reserved for the decimal point.



**goal** Practice in ordering and comparing numbers from 100 through 149

**warm-up** Write on the board:  
 is less than                      is greater than  
*What does this say? Who can make the symbol that says this?*

Now write these on the board:

101 ○ 108      103 ○ 98  
 104 ○ 102      110 ○ 120

Choose pupils to complete the statements by making the correct symbol in each circle.

**page 80** An independent activity or with your guidance—you decide. No one knows the abilities of your pupils as well as you do.

Watch for pupils who write **less** in the blank and then make the **greater than** symbol. (The reverse may happen too.) They need help with the symbols, not with understanding place value.

80

Complete the table.

100	101	102	103	104	105	106	107	108	109
110	111	112	113	114	115	116	117	118	119
120	121	122	123	124	125	126	127	128	129
130	131	132	133	134	135	136	137	138	139
140	141	142	143	144	145	146	147	148	149

Put the word “greater” or “less” in the blank.

Put the symbol for the word in the ring.

100 is <u>greater</u> than 99. 100 ○ 99	101 is <u>less</u> than 110. 101 ○ 110	130 is <u>greater</u> than 120. 130 ○ 120
100 is <u>less</u> than 110. 100 ○ 110	141 is <u>less</u> than 151. 141 ○ 151	114 is <u>less</u> than 115. 114 ○ 115

PURPOSE: Reinforcing 100 through 149.

name \_\_\_\_\_

Write ten more.

hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones
1	3	0	1	4	0	1	4	0	1	5	0
hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones
1	2	0	1	3	0	1	0	0	1	1	0
hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones
1	7	0	1	8	0	1	6	0	1	7	0
hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones
1	5	0	1	6	0	1	5	0	1	6	0

# **lesson** Pages 80, 81

**goal** Practice with place value

**things** counters:  
 1 group of 100  
 9 groups of 10  
 for each pupil:  
 place-value chart  
 numeral cards

**warm-up** Display the group of 100 and 3 tens. *Show how many in your charts.* Add 1 more ten to the display. *Now how many? Observe whether any children seem confused. How many hundreds? How many tens? How many ones?* These questions should get them back on the track. *Be careful! I'm going to fool you.* Continue changing the display by manipulating only the number of tens. Praise the youngsters who catch on to what you are doing.

**page 81** *What will you do on this page?* Complete the first column together; everybody should then be able to work independently.

**goal** Exploration of adding sets of 10

**page 82** This is a *fun* page for independent readers. It's also a great page to dramatize. Try it as the youngsters check their own answers.

Watch for youngsters who have trouble with the last four lines. Provide similar concrete counting experiences until they can handle such problems as 32 and 10 more.

82



I have 10.  
 And I have 10.  
 I have 10 too.  
 Count my 10. Now how many in all? 40  
 Count my 10 too.  
 I have 10 too.  
 Don't forget my 10. Now how many in all? 70  
 Here are 10 more.  
 And I have 10.  
 Count my 10. Now how many in all? 100  
 Can add 10 more? How many in all? 110  
 Can add 10 more? How many in all? 120  
 Can add 10 more? How many in all? 130  
 What if added 3 more? How many in all? 133  
 Could you add 7 more? Now how many in all? 140  
 Could you add 10 more? Yes Could everybody add 10 more? Yes

PURPOSE: Exploring sets of tens.

name \_\_\_\_\_

Add

$$\begin{array}{r} 60 \\ + 30 \\ \hline 90 \end{array}$$

$$\begin{array}{r} 60 \\ + 40 \\ \hline 100 \end{array}$$

$$\begin{array}{r} 60 \\ + 50 \\ \hline 110 \end{array}$$

$$\begin{array}{r} 60 \\ + 60 \\ \hline 120 \end{array}$$

$$\begin{array}{r} 60 \\ + 70 \\ \hline 130 \end{array}$$

$$\begin{array}{r} 70 \\ + 30 \\ \hline 100 \end{array}$$

$$\begin{array}{r} 70 \\ + 40 \\ \hline 110 \end{array}$$

$$\begin{array}{r} 70 \\ + 50 \\ \hline 120 \end{array}$$

$$\begin{array}{r} 70 \\ + 60 \\ \hline 130 \end{array}$$

$$\begin{array}{r} 70 \\ + 70 \\ \hline 140 \end{array}$$

$$\begin{array}{r} 80 \\ + 30 \\ \hline 110 \end{array}$$

$$\begin{array}{r} 80 \\ + 40 \\ \hline 120 \end{array}$$

$$\begin{array}{r} 80 \\ + 50 \\ \hline 130 \end{array}$$

$$\begin{array}{r} 80 \\ + 60 \\ \hline 140 \end{array}$$

$$\begin{array}{r} 80 \\ + 70 \\ \hline 150 \end{array}$$

$$\begin{array}{r} 90 \\ + 30 \\ \hline 120 \end{array}$$

$$\begin{array}{r} 90 \\ + 40 \\ \hline 130 \end{array}$$

$$\begin{array}{r} 90 \\ + 50 \\ \hline 140 \end{array}$$

$$\begin{array}{r} 90 \\ + 60 \\ \hline 150 \end{array}$$

$$\begin{array}{r} 100 \\ + 30 \\ \hline 130 \end{array}$$

$$\begin{array}{r} 100 \\ + 40 \\ \hline 140 \end{array}$$

$$\begin{array}{r} 100 \\ + 50 \\ \hline 150 \end{array}$$

$$\begin{array}{r} 110 \\ + 10 \\ \hline 120 \end{array}$$



**goal** Practice in adding two multiples of 10

**memo** The pupils have added two multiples of 10 before, but the sums were less than 100. This is their first experience with sums greater than or equal to 100. Readiness for renaming is being developed. Combinations for eleven seem to cause trouble. For reasons unknown, some youngsters tend to write 111 rather than 110 for the following problems:

$$\begin{array}{r} 30 \\ + 80 \\ \hline \end{array}$$

$$\begin{array}{r} 60 \\ + 50 \\ \hline \end{array}$$

$$\begin{array}{r} 70 \\ + 40 \\ \hline \end{array}$$

**warm-up** Write on the board:

$$\begin{array}{r} 4 \\ + 7 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ + 6 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ + 7 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ + 4 \\ \hline \end{array}$$

Have four volunteers write the sum. *Don't let me catch you!* Annex a zero to each addend. *Are your answers correct? Can you write the correct sum?*

**page 83** *Any questions?* Everyone should get along just fine. Watch for addition-fact errors. Provide more fact practice if necessary.

After checking answers, look for patterns. Look across the rows, down the columns, and along diagonal lines (upper right to lower left).

Was anyone frustrated by the problems in the last row? These problems are a real challenge; they provide the children with an opportunity to do some thinking and move forward on their own.



**goal** Practice in adding two multiples of 10

**warm-up** Write on the board:

$$\begin{array}{r} 20 \\ + 30 \\ \hline \end{array} \quad \begin{array}{r} 40 \\ + 30 \\ \hline \end{array} \quad \begin{array}{r} 60 \\ + 20 \\ \hline \end{array} \quad \begin{array}{r} 30 \\ + 30 \\ \hline \end{array}$$

You'll need four volunteers to write the sums. *I'm going to try to fool you!* Write a 1 in the hundreds position of the top addend of each problem so that these will read: 120 140 160 130. *Are these answers correct now? Can you make the answer correct?* Try four more problems of the kind shown on the page. Careful—no renaming.

**page 84** *Oh-h-h! Look at all those spiders!* What will you do on this page? You can give each spider another name. Everyone should work independently. Examine errors. Is the trouble facts?

**ADD**

**120**  
 $+ 30$   

---

**150**

**140**  
 $+ 20$   

---

**160**

**160**  
 $+ 10$   

---

**170**

**170**  
 $+ 20$   

---

**190**

**150**  
 $+ 20$   

---

**170**

**110**  
 $+ 60$   

---

**170**

**130**  
 $+ 30$   

---

**160**

**170**  
 $+ 30$   

---

**200**

**120**  
 $+ 50$   

---

**170**

**140**  
 $+ 30$   

---

**170**

**140**  
 $+ 50$   

---

**190**

**160**  
 $+ 20$   

---

**180**

**120**  
 $+ 20$   

---

**140**

**110**  
 $+ 70$   

---

**180**

**140**  
 $+ 40$   

---

**180**

**120**  
 $+ 10$   

---

**130**

**130**  
 $+ 50$   

---

**180**

**140**  
 $+ 10$   

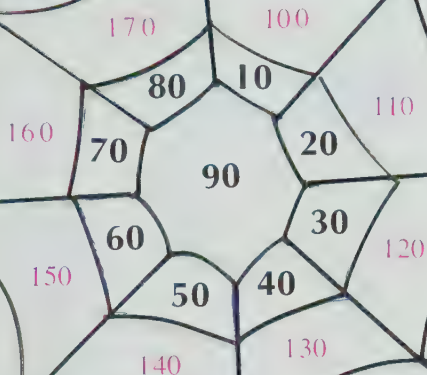
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**150**

**PURPOSE:** Practice adding two multiples of ten.

name \_\_\_\_\_

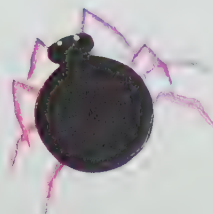
add



Write another problem  
with the same sum.

$$90 + 60 = 150$$

$$80 + \underline{70} = 150$$



$$110 + 20 = 130$$

$$70 + \underline{60} = 130$$

$$50 + 90 = 140$$

$$60 + \underline{80} = 140$$

$$120 + 50 = 170$$

$$90 + \underline{80} = 170$$

$$60 + 50 = 110$$

$$70 + \underline{40} = 110$$

$$140 + 30 = 170$$

$$80 + \underline{90} = 170$$

**goal** Practice in adding two multiples of 10

**page 85** A lot of thinking needs to be done with this page. *That spider has spun a very special web! But the web isn't finished.* Help everyone get started adding 90 to each number in the web and recording the sum in the appropriate outer section.

*Two problems with the same answer. You'll have to do some real thinking! Work at least the first problem together.*

**goal Progress Check**—adding two multiples of 10

**page 86** Two rows of problems will do a good job of checking progress. Three kinds of problems are included:

$$\begin{array}{r} 100 \\ + 50 \\ \hline \end{array} \quad \begin{array}{r} 80 \\ + 70 \\ \hline \end{array} \quad \begin{array}{r} 120 \\ + 40 \\ \hline \end{array}$$

Examine errors. The addition facts are the most likely cause of trouble. The games and activities suggested in chapter 1 will help. Any other cause of trouble will need your personal attention.

Use the remaining two rows to recheck after more practice or on a later day.

86

**ADD**

$$\begin{array}{r} 100 \\ + 50 \\ \hline 150 \end{array}$$

$$\begin{array}{r} 80 \\ + 70 \\ \hline 150 \end{array}$$

$$\begin{array}{r} 120 \\ + 40 \\ \hline 160 \end{array}$$

$$\begin{array}{r} 110 \\ + 40 \\ \hline 150 \end{array}$$

$$\begin{array}{r} 90 \\ + 60 \\ \hline 150 \end{array}$$

$$\begin{array}{r} 70 \\ + 70 \\ \hline 140 \end{array}$$

$$\begin{array}{r} 120 \\ + 20 \\ \hline 140 \end{array}$$

$$\begin{array}{r} 50 \\ + 90 \\ \hline 140 \end{array}$$

$$\begin{array}{r} 110 \\ + 30 \\ \hline 140 \end{array}$$

$$\begin{array}{r} 100 \\ + 40 \\ \hline 140 \end{array}$$

$$\begin{array}{r} 30 \\ + 80 \\ \hline 110 \end{array}$$

$$\begin{array}{r} 50 \\ + 70 \\ \hline 120 \end{array}$$

$$\begin{array}{r} 80 \\ + 50 \\ \hline 130 \end{array}$$

$$\begin{array}{r} 70 \\ + 80 \\ \hline 150 \end{array}$$

$$\begin{array}{r} 90 \\ + 90 \\ \hline 180 \end{array}$$

$$\begin{array}{r} 70 \\ + 40 \\ \hline 110 \end{array}$$

$$\begin{array}{r} 110 \\ + 20 \\ \hline 130 \end{array}$$

$$\begin{array}{r} 60 \\ + 70 \\ \hline 130 \end{array}$$

$$\begin{array}{r} 130 \\ + 10 \\ \hline 140 \end{array}$$

$$\begin{array}{r} 120 \\ + 30 \\ \hline 150 \end{array}$$

PURPOSE: Progress check—practice in adding multiples of ten.



See activity 7, page 92b.



See activity 8, page 92b.

name \_\_\_\_\_



There are 90.

I need 10.



And I need 10.



I'll take 10.



Where's my 10?



I need 10.



Me too.



I must have 10.



Me too.



Don't forget me.



Where's mine?

Now how many? 80

Now how many? 70

Now how many? 60

Now how many? 50

Now how many? 40

Now how many? 30

Now how many? 20

Now how many? 10

Now how many? 0

A possible answer: His got lost.

**goal** Exploration of subtracting sets of 10

**page 87** This page parallels page 82, but here you have subtraction. Use the same procedure you used before. Dramatization will prove effective.



**goal** Practice in subtracting multiples of 10

**things** 6 groups of 10 counters



**warm-up** Display 6 tens with counters. *How many tens?* (6) Take away 1 ten. *Now how many tens?* (5) Put back the ten. Begin again. Take away 2 tens. *Now how many tens?* (4) Put back the tens. Begin again. This time take away 3 tens. *Now how many tens?* (3) Put back the tens. *What is another name for 6 tens?* (60) Repeat the action. A “How many?” question should bring answers of 50, 40, and 30.

**page 88** Begin together. Have everyone complete the top row. Focus on the first problem in the second row. *Is this problem like the one above it? How?* (Subtracting 10 is the same as subtracting 1 ten.) *What about the next problem?* Go on to the third problem. Let those who see the relationship complete the page independently. Continue to work with the others.

Was anyone tricked by the last two problems?

88

Fill in the missing numbers.

	Subtract 1 ten.	Subtract 2 tens.	Subtract 3 tens.																								
	<table border="1"> <tr><td>tens</td><td>ones</td></tr> <tr><td>9</td><td>0</td></tr> </table>	tens	ones	9	0	<table border="1"> <tr><td>tens</td><td>ones</td></tr> <tr><td>8</td><td>0</td></tr> </table>	tens	ones	8	0	<table border="1"> <tr><td>tens</td><td>ones</td></tr> <tr><td>7</td><td>0</td></tr> </table>	tens	ones	7	0												
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7	0																										
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tens	ones																										
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2	0																										
tens	ones																										
4	0																										
– 3	0																										
1	0																										
	$80 + 10 = \underline{90}$	$80 - 10 = \underline{70}$																									

PURPOSE: Practice in subtracting multiples of ten.

name \_\_\_\_\_

**Subtract**

$$\begin{array}{r} 50 \\ - 10 \\ \hline 40 \end{array}$$

$$\begin{array}{r} 50 \\ - 20 \\ \hline 30 \end{array}$$

$$\begin{array}{r} 50 \\ - 30 \\ \hline 20 \end{array}$$

$$\begin{array}{r} 50 \\ - 40 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 50 \\ - 50 \\ \hline 0 \end{array}$$

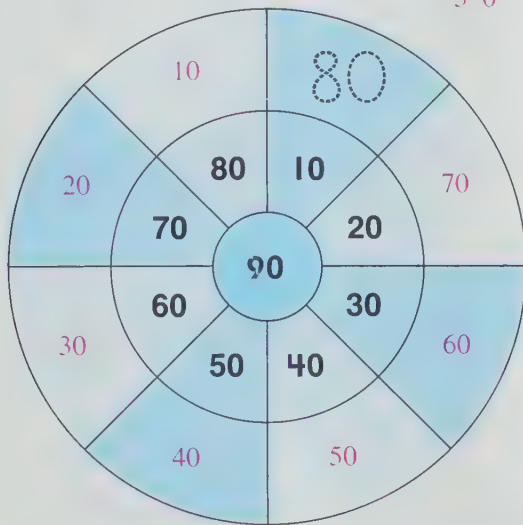
Complete the subtraction.

$$\begin{array}{r} 60 \\ - 10 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 60 \\ - 20 \\ \hline 40 \end{array}$$

$$\begin{array}{r} 60 \\ - 30 \\ \hline 30 \end{array}$$

$$\begin{array}{r} 60 \\ - 40 \\ \hline 20 \end{array}$$



$$\begin{array}{r} 70 \\ - 10 \\ \hline 60 \end{array}$$

$$\begin{array}{r} 70 \\ - 20 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 70 \\ - 30 \\ \hline 40 \end{array}$$

$$\begin{array}{r} 80 \\ - 10 \\ \hline 70 \end{array}$$

$$\begin{array}{r} 80 \\ - 20 \\ \hline 60 \end{array}$$

$$\begin{array}{r} 90 \\ - 10 \\ \hline 80 \end{array}$$

**goal** Practice in subtracting multiples of 10

**page 89** *What will you do on this page?*  
Let pupils who are ready work by themselves. Determine whether the zeros or the subtraction facts are causing the others trouble.

After checking, look for patterns (across, down, and on the diagonal lines). *Did anyone use patterns to help find the answers?*  
*How?*

**goal** Practice in subtracting multiples of 10

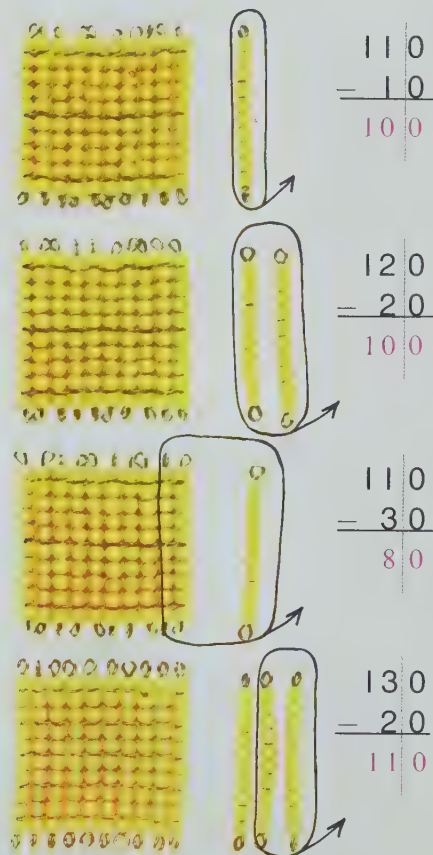
**memo** The pupils will be introduced to problems such as 
$$\begin{array}{r} 120 \\ - 30 \\ \hline \end{array}$$

They will look at 120 as 12 tens, from which they can subtract 3 tens without all the fuss of renaming.

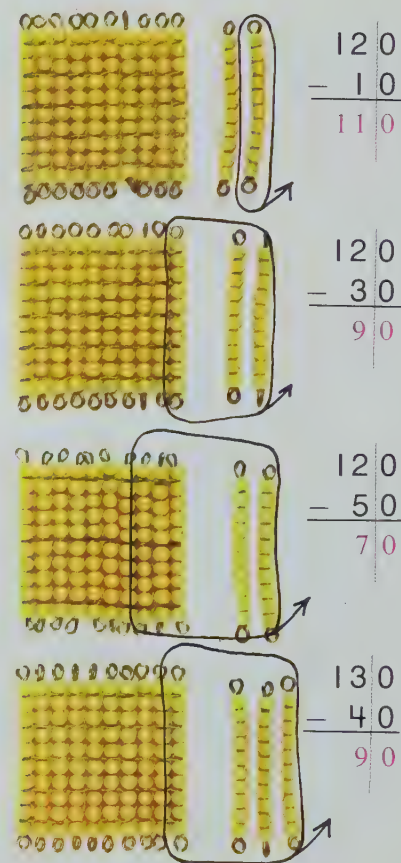
**page 90** *There surely are a lot of beads on this page! Can anyone think of a simple, timesaving way to count the beads for the first problem? Probe with questions until someone discovers that each wire has 10 beads and the easy way is to count by tens. Count how many. What's another name for 10 tens? (100) What's another name for 11 tens? (110) Focus on the numbers. Who has a good idea for solving the problem? Why is there a ring around 1 wire of 10 beads and an arrow pointing away? How many are left?*

Do one more problem together and then let pupils who are ready finish the page by themselves. Watch for youngsters who need more practice with subtraction facts in order to be successful.

90



PURPOSE: Practice in subtracting multiples of ten.



**things** 2 wood cubes, counters

Label the faces of the cubes as follows:

- 110, 120, 130, 140, 150, 160
- 40, 50, 60, 70, 80, 90

The counters are used to keep score. In turn each player rolls the cubes and subtracts

the two numbers that land faceup. The player receives one counter for a correct answer and returns one counter for a wrong answer. The player with the most counters wins.

name \_\_\_\_\_

**SUBTRACT**

$\begin{array}{r} 70 \\ - 70 \\ \hline 0 \end{array}$	$\begin{array}{r} 80 \\ - 20 \\ \hline 60 \end{array}$	$\begin{array}{r} 90 \\ - 50 \\ \hline 40 \end{array}$	$\begin{array}{r} 90 \\ - 30 \\ \hline 60 \end{array}$	$\begin{array}{r} 80 \\ - 40 \\ \hline 40 \end{array}$
$\begin{array}{r} 150 \\ - 80 \\ \hline 70 \end{array}$	$\begin{array}{r} 180 \\ - 70 \\ \hline 110 \end{array}$	$\begin{array}{r} 160 \\ - 50 \\ \hline 110 \end{array}$	$\begin{array}{r} 180 \\ - 40 \\ \hline 140 \end{array}$	$\begin{array}{r} 150 \\ - 60 \\ \hline 90 \end{array}$
$\begin{array}{r} 80 \\ - 30 \\ \hline 50 \end{array}$	$\begin{array}{r} 70 \\ - 40 \\ \hline 30 \end{array}$	$\begin{array}{r} 70 \\ - 60 \\ \hline 10 \end{array}$	$\begin{array}{r} 90 \\ - 20 \\ \hline 70 \end{array}$	$\begin{array}{r} 90 \\ - 70 \\ \hline 20 \end{array}$
$\begin{array}{r} 160 \\ - 80 \\ \hline 80 \end{array}$	$\begin{array}{r} 140 \\ - 90 \\ \hline 50 \end{array}$	$\begin{array}{r} 180 \\ - 50 \\ \hline 130 \end{array}$	$\begin{array}{r} 170 \\ - 60 \\ \hline 110 \end{array}$	$\begin{array}{r} 150 \\ - 70 \\ \hline 80 \end{array}$

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PURPOSE: Progress check—subtracting multiples of ten.

**goal** **Progress Check**—subtracting multiples of 10

**page 91** Assign the first two rows to some pupils and the other two rows to the others. Two rows provide enough problems to check progress. This is independent work. Examine any errors. If the trouble is facts, have the pupil practice facts. You may want to use the two rows not yet completed to recheck progress after the facts have been mastered.



See activity 9, page 92b.



See activity 10, page 92b.



**goal Checkout**—adding and subtracting multiples of 10

**memo** Progress in addition and in subtraction has been checked separately. This page brings the two skills together.

**page 92** *Why are you warned on the page to be careful? How can you help yourself so you won't make silly mistakes?*

Examine all mistakes. The two most likely causes are these:

- The operation symbol
- The facts

Pupils who did not follow the operation symbols should try again and correct their errors. There's only one cure for the facts—more practice. **Ugh!** Use the youngsters' favorite game. Consider asking parents to help. Be sure to identify the specific facts their child needs to practice, and suggest ways in which this can be done.

92

Complete each problem.  
Be careful!

80  
+ 30  
110

130  
- 70  
60

150  
+ 30  
180

140  
+ 50  
190

160  
- 70  
90

40  
+ 70  
110

60  
+ 70  
130

90  
- 60  
30

80  
- 30  
50

110  
- 40  
70

140  
- 70  
70

PURPOSE: Checkout—adding and subtracting multiples of ten.



See activity 11, page 92b.



**things** game board from activity 10, page 92b; cards

Only the set of problem cards needs to be changed. Use problems similar to those on the page.

# RESOURCES

## another form of evaluation

for progress check — page 75

Add.				
40	20	30	40	30
+ 60	+ 30	+ 50	+ 20	+ 40
<u>100</u>	<u>50</u>	<u>80</u>	<u>60</u>	<u>70</u>
40	50	50	10	70
+ 50	+ 50	+ 20	+ 50	+ 30
<u>90</u>	<u>100</u>	<u>70</u>	<u>60</u>	<u>100</u>
30	60	20	60	20
+ 30	+ 30	+ 60	+ 10	+ 80
<u>60</u>	<u>90</u>	<u>80</u>	<u>70</u>	<u>100</u>

for progress check — page 86

Add.				
80	100	130	70	130
+ 50	+ 70	+ 60	+ 90	+ 50
<u>130</u>	<u>170</u>	<u>190</u>	<u>160</u>	<u>180</u>
150	60	160	30	110
+ 20	+ 50	+ 30	+ 70	+ 70
<u>170</u>	<u>110</u>	<u>190</u>	<u>100</u>	<u>180</u>
40	120	140	170	20
+ 70	+ 50	+ 30	+ 20	+ 90
<u>110</u>	<u>170</u>	<u>170</u>	<u>190</u>	<u>110</u>
60	140	80	150	50
+ 90	+ 50	+ 30	+ 30	+ 90
<u>150</u>	<u>190</u>	<u>110</u>	<u>180</u>	<u>140</u>

for progress check — page 91

Subtract.				
190	60	180	120	80
- 70	- 60	- 50	- 90	- 70
<u>120</u>	<u>0</u>	<u>130</u>	<u>30</u>	<u>10</u>

160	150	160	180	90
- 50	- 90	- 70	- 50	- 20
<u>110</u>	<u>60</u>	<u>90</u>	<u>130</u>	<u>70</u>
180	110	140	60	140
- 30	- 70	- 80	- 50	- 70
<u>150</u>	<u>40</u>	<u>60</u>	<u>10</u>	<u>70</u>
120	70	170	110	190
- 70	- 10	- 50	- 30	- 40
<u>50</u>	<u>60</u>	<u>120</u>	<u>80</u>	<u>150</u>

for checkout — page 92

Complete each problem.  
Be careful!

40	130	160	80
+ 80	+ 40	- 90	- 50
<u>120</u>	<u>170</u>	<u>70</u>	<u>30</u>
120	70	70	110
+ 70	+ 50	- 40	- 80
<u>190</u>	<u>120</u>	<u>30</u>	<u>30</u>
160	60	150	140
+ 30	+ 80	- 80	- 60
<u>190</u>	<u>140</u>	<u>70</u>	<u>80</u>

## activities

1. **things** cards, felt pen, bundles of 10, single counters

Prepare 4 name cards for each 2-digit number selected:

4 tens 3 ones	43
forty-three	tens   ones 4   3

Hide the cards around the room. Everyone now becomes a number detective. A case is not solved until all 4 names for a number have been found and the detective has shown the number with counters. Awards can be given for accomplishing this task. The hunt may go on for several days until all the hidden cards are found.

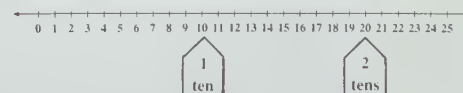
2. **things** oaktag, felt pen, yarn or string

Prepare two place-value signs with the felt pen and oaktag—**tens**, **ones**. Attach yarn so that each sign can be hung around a child's neck.

Choose 2 children to stand in front of the group, wearing the place-value signs. They form the numeration machine. Make sure that the **tens** sign is on the left. Have a child write a 2-digit numeral on the chalkboard. The numeration machine must show the number by holding up fingers to show the number of tens and the number of ones. If 26 is the number, the tens child holds up 2 fingers and the ones child holds up 6 fingers. Any pupil who sees a mistake and can correct it replaces the faulty part in the machine.

3. **things** number line from 0 through 100

Display a number line from 0 through 100 on the narrow cork strip above the chalkboard or on the chalkboard itself. Have the children make 9 signposts labeled 1 ten, 2 tens, 3 tens, . . . , 9 tens. To place the signposts, count aloud together: *one, two, three, . . . ten; one, two, three, . . . ten; and so on*. As each ten is counted display the appropriate sign.



Several kinds of practice are possible:

- *How many tens, how many ones, in 18?*  
Locate 18 on the number line. Its position shows 1 ten and 8 ones. Continue with other 2-digit numbers.
- *How many tens in 56? in 79?*
- *Which number is more—27 or 72? How do you know? (Number of tens)*
- *Which number is less—42 or 46? How do you know?*

#### 4. things tagboard cards

Prepare problem cards as shown—no two cards exactly alike.

$\begin{array}{r} 70 \quad 10 \quad 60 \quad 20 \\ + 20 + 90 + 30 + 80 \\ \hline \end{array}$	$\begin{array}{r} 90 \quad 100 \quad 90 \quad 100 \\ \hline \end{array}$
$\begin{array}{r} 30 \quad 60 \quad 40 \quad 50 \\ + 50 + 10 + 50 + 50 \\ \hline \end{array}$	$\begin{array}{r} 80 \quad 70 \quad 90 \quad 100 \\ \hline \end{array}$

Cut a long slot where the answers should be written. On the reverse side of the card write each answer above the slot in the corresponding position.

The pupil lays the problem card over a sheet of paper, records his answers through the slot, turns the card over, and checks his answers. Pupils can exchange cards for more practice.

#### 5. things slips of scratch paper

Each person decides on a 1-digit number to add and writes that number on a slip of paper. These numbers are kept secret. Someone is chosen to be **It**. The other children take turns calling out a 1-digit number. **It** mentally adds his secret number to each number called out and says the answer aloud. This continues until those calling out the numbers discover the secret number belonging to **It**. Play continues until everyone has had a turn at being **It**. Suggest that callers record the answers given by **It** if they have any trouble discovering the secret number. Some children see patterns faster than they hear them.

#### 6. things snap clothespins, length of clothesline, container

Write a numeral on each clothespin. Suspend a length of clothesline. Mix the clothespins in the container. The pupil clips the clothespins to the clothesline, arranging the numerals in order.

#### 7. things 2 wood cubes, counters

Label the faces of the cubes as follows:

- 10, 20, 30, 40, 50, 60
- 70, 80, 90, 110, 120, 130

Set the counters to one side. In turn the player rolls the 2 cubes and says the sum of the numbers that land faceup. One counter is given for each correct answer; one counter is returned for each wrong answer. The player with the most counters wins.

#### 8. Provide the pupils with the following directions:

1. Write down any six numbers from 0 through 18.
2. Add 7 to each number.
3. Subtract 5 from each answer in step 2.
4. Add 6 to each answer in step 3.
5. Subtract 8 from each answer in step 4.
6. What happened? (Should have the original six numbers)

#### 9. Adapt the technique used in activity 4 to the appropriate type of practice.

$\begin{array}{r} 140 \quad 80 \quad 170 \quad 50 \quad 150 \\ - 70 \quad - 30 \quad - 80 \quad - 10 \quad - 80 \\ \hline \end{array}$	$\begin{array}{r} 110 \quad 120 \quad 70 \quad 180 \quad 90 \\ - 80 \quad - 50 \quad - 70 \quad - 70 \quad - 40 \\ \hline \end{array}$
--	--

#### 10. things large piece of oilcloth or plastic, felt pen, cards, string or yarn

On the oilcloth make a 3-by-3 array of squares—each square large enough for a child to stand in. You may decide to draw the game board on the floor with chalk instead. Prepare a set of problem cards, like those used on the page, 5 cards with a large **X** and 5 cards with large **O**. Attach yarn to the **X** and **O** cards to form tags that identify the team members.

Show a problem to the first player on one of the teams. If he can give the correct sum, he may stand in any square on the game board. If his answer is wrong, a member of the opposing team takes a square on the game board. Teams alternate answering a problem. The first team to place 3 players in a row, column, or diagonal wins.

#### 11. things tongue depressors, glue, beans

Have the pupils make ten-sticks by gluing 10 dried beans on each tongue depressor. Each pupil will need 9 ten-sticks.

Pair pupils. Challenge them to form with their 18 ten-sticks and then record as many addition and subtraction sentences as they can.

## additional learning aids

### notation—chapter objective 1

#### SRA products

*Computapes*, SRA (1972)  
Module 2, Lesson: AS 27  
*Mathematics Involvement Program*, SRA (1971)  
Cards: 181, 261, 262, 272, 353  
*Skill through Patterns*, level 2, SRA (1974)  
Spirit master: 20

**other learning aids** (described on page 128f)—  
Chip Trading, Flip-A-Strip Place Value Chart, Number-Blox

### operation—chapter objectives 2 and 3

#### SRA products

*Arithmetic Fact Kit*, SRA (1969)  
Addition Cards: 27–29  
*Computapes*, SRA (1972)  
Module 1, Lessons: AS 7, 9  
*Skill through Patterns*, level 2, SRA (1974)  
Spirit masters: 11, 12  
*Visual Approach to Mathematics*, level 2, SRA (1967) Visual: 8



# 4 GEOMETRY

**before this chapter the learner has —**

1. Examined objects to find how they are alike and how they are different
2. Handled objects and talked about which things felt flat and which things felt curved

**in chapter 4 the learner is —**

1. Matching the shapes of real objects with solid geometric shapes
2. Examining the surfaces of cubes, cylinders, spheres, prisms, and pyramids
3. Finding edges and corners on real objects
4. Sorting boxes, cans, balls, blocks, and so on to find rectangular prisms, triangular prisms, cubes, and cylinders

**in later levels the learner will —**

1. Master identifying the flat or curved surfaces on rectangular prisms, triangular prisms, spheres, and cylinders
2. Identify the sides and corners of plane figures

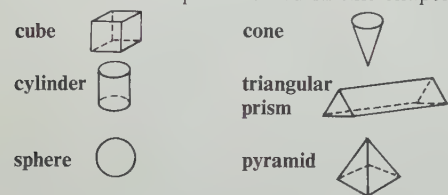




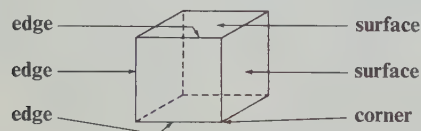
# Notes & Things

Get out the junk boxes you read about on page *viii*. This chapter is designed to help the children *explore* objects from the real world: boxes, bricks, cans of peas, candles, oranges, balloons, and so on. We all become familiar with these objects by looking at them, touching them, and using them. By hands-on experiences, we learn to see similarities and distinguish differences among objects. This is the way the unit on geometry begins. Children will first look at and handle physical objects with which they are familiar and will then move to the abstract ideas of geometric shapes.

Here are the shapes featured in this chapter.



And here are some of the ideas the youngsters will investigate as they handle the objects. Every solid figure has a *surface* that may be either flat or curved. When two surfaces meet, an *edge* is formed. When three edges meet, a *corner* is formed. As an example, look at a cube. Some of its surfaces and edges and a corner have been marked in this illustration.



Every cube has six flat surfaces, twelve edges, and eight corners. The children will be finding this information for each of the solid figures shown above. The exploration will increase their awareness of the similarities and differences of the various solid shapes, and will make the identification and sorting of objects by shape a much easier task.

It is very difficult to show a 3-dimensional object by a line drawing or a photograph. Please look through the pupil pages and determine which objects shown might be collected, so that the children can relate the picture to the real thing.

The size relationship of one object to another is also a problem that has not been resolved on these pages. Look at page 94, for example. You'll find pictures of a globe, a checker, a golf ball, a toy truck and a spool of thread. Pictured in the next column you'll see a roll of paper towels (anyone could be fooled by that one), a box, a candle, a brick, and a balloon. We would be expecting a lot from children not only to ask them to name each object but also to assume that they have actually seen or touched such an object. This entire chapter's success will depend largely on the child's experience with real things.

The classroom won't get nearly as messy as you might expect, and the youngsters will make so many glorious discoveries about ordinary things that this chapter will be a joy for everyone.

Please see Letter to Parents on page 101a before you begin this chapter.

## words

Concept-development words and phrases introduced in this chapter are listed in the order in which they are used orally. Those words that also appear on pupil pages are marked with an \*.

cubes	surfaces*	triangular prism
cylinders	cones*	pyramids*
spheres	prism*	edges*
		corners*

## things

boxes (cube-shaped), cans, balls  
solid geometric cone  
cone-shaped paper cups  
models of pyramid, cylinder, cone, sphere  
models of prisms—rectangular, triangular, and square

For the extra activities you will want to have these things available:

circular plastic lid  
paper plate and cup  
picture frame  
milk carton  
orange  
plastic pie container  
paste and paint  
string  
adhesive tape

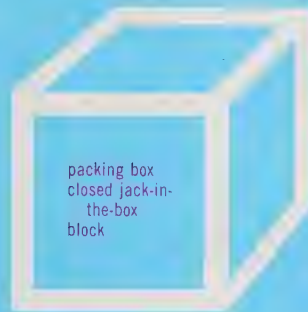
name \_\_\_\_\_

# What things are shaped like these?

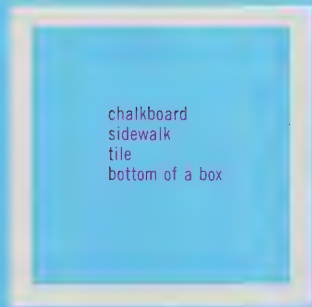
Answers will vary. Examples are shown.



plate  
clockface  
bottom of a  
flowerpot  
or tin can



packing box  
closed jack-in-  
the-box  
block



chalkboard  
sidewalk  
tile  
bottom of a box



chalk  
paper-towel tube  
tin can

© 1974, SRA

PURPOSE: Exploring shapes.



**things** box, can, circular plastic lid, paper plate, picture frame

Extend the discussion of the page by examining real objects. *Which picture on the page shows a shape like this?*

**goal** Survey—knowledge of plane figures and 3-dimensional geometric shapes

**memo** The focus is on **awareness** of geometric shapes in the real world.

**page 93** Your job is to lead and listen. Your pupils' job is to think and share ideas. Examine the shapes one at a time. *Do you know anything that looks like this? Something little? Something big? Something to play with? Something in this room? Something to eat? Does this shape have a name?* (Circle, square, cube, cylinder) This is a survey. Accept the words the children use for the present. Note the children who seem unaware of shapes in the world around them—they will need lots of hands-on experiences.

Extend the page with a special homework assignment. Have your detectives bring something from home that is shaped like each figure shown.

**goal** Matching the shapes of real objects with solid geometric shapes

**memo** It's very important that every child have hands-on experience with boxes, cans, and balls of various sizes before they start work on page 94. Each child needs a chance to sort out the boxes in one group, cans in the second group, and balls in the third. Only then can the learner decide how the groups of objects are alike and how they are different. After the objects are sorted into groups of CUBES, CYLINDERS, and SPHERES, write the appropriate name on a card and place it with the objects.

**things** boxes, cans, balls




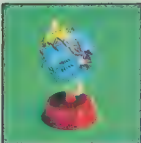




**page 94** The objects the children have just handled should be available for comparison. Start with the first picture of the globe. *Look at the blue shapes that show the cube, cylinder, and sphere. Which of these shapes does the globe look most like? Make a check mark to show your decision.*







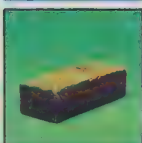
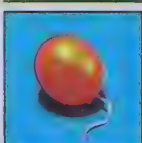
It's not easy for a child to work with 2-dimensional pictures of 3-dimensional objects. Have as many of the real objects available as possible to settle disputes and reinforce learning.

When the page is completed, go back to review the cube, cylinder, and sphere. How are these shapes alike? How are they different?

94

Check which shape it's most like.

			
			✓
		✓	
			✓
	✓		
		✓	

			
		✓	
	✓		
		✓	
	✓		
			✓

PURPOSE: Exploring the shapes of solid figures.






**things** boxes, tin cans, and balls of various sizes

More hands-on experience. Have the youngsters compare the objects for likenesses and differences. *How is a box different from*

*a ball? a ball different from a can? a can different from a box? Are a ball and a can alike in any way? A can and a box?*

name \_\_\_\_\_

INVESTIGATE AND ANSWER	Will it sit flat?	How many flat surfaces?	Will it roll easily?	How many curved surfaces?
 cube	Yes	6	No	0
 can	Yes	2	Yes	1
 ball	No	0	Yes	1

**goal** Exploring the SURFACES of cubes, cylinders, and spheres

**things** boxes (cube shaped), cans, balls

**page 95** Work in groups. Each group must have some boxes, cylinders, and balls for hands-on experience. The youngsters should test each shape to answer the questions. *Can a box sit flat? What does flat mean? Mark an X on the top surface. Turn it over. Does the box still sit flat? Mark an X on that top surface. Turn it again. Does it sit flat? Repeat until all sides have been tested. Continue to the cylinder. Can you make a cylinder sit flat? Turn it over. Does it still sit flat? Will it always sit flat no matter how you put it on the table? What about a sphere? Will it sit flat? The sphere can be made to sit still, but a tiny push will start it rolling. What happens if you give a box a tiny push? A cylinder?*

When surfaces are to be counted, the youngsters will have to number each side as it is tested.

After the page is finished, go on a room search. What objects are shaped like the cube, the cylinder, or the sphere?



## goal Exploring the surfaces of CONES

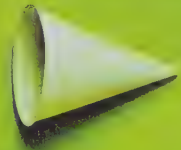

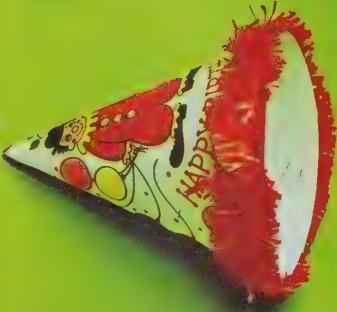

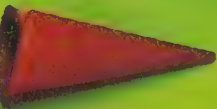


**memo** Exploring the surfaces of a cone can be a problem. This is one of the times that geometry and the real world don't cooperate very well. A cone is a solid geometric figure. As a solid it has a **bottom**—a flat surface. But the notion of a cone is so functional in the real world as a container that we don't have a flat surface—or even a solid geometric figure. If this causes confusion for the children, have them pretend that the paper cup has been filled with water and frozen, or that the ice-cream cone has been filled to the top of the cone with ice cream. Then these cones will have a flat surface.

**things** solid geometric cone  
paper cups (cone shaped)

**warm-up** If the upper-grade rooms in your school have sets of solid geometric shapes, borrow the cones. *Do you know of anything shaped like this? Do you know the special name for this shape? (Cone) Is a cone like a cylinder? What's different?* Compare the cone to a sphere and to a cube. How are they alike? How are they different from one another?

**page 96** Discuss the questions one at a time. Experiment with a paper cup before making decisions.

96

	Will it sit flat?	Will it roll easily?	
	<b>YES</b> X	<b>YES</b> X	<b>How is it like a  ?</b> It sits flat; has a curved surface, a flat surface, and an edge.
	<b>NO</b>	<b>NO</b>	<b>How is it different from a  ?</b> It has only 1 flat surface. Cylinder has 2. It comes to a point.
	<b>YES</b> X	<b>YES</b> X	<b>How is it like a  ?</b> It sits flat and has an edge and a flat surface.
	<b>NO</b>	<b>NO</b>	<b>How is it different from a  ?</b> It has a curved surface, and it comes to a point. It has 1 flat surface; cube has 6.
	<b>YES</b> X	<b>YES</b> X	<b>Is this a cone?</b> Yes
	<b>NO</b>	<b>NO</b>	<b>Does a cone have a flat surface?</b> Yes
			<b>Does a cone have a curved surface?</b> Yes

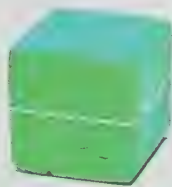
Each object is shaped like a cone.

PURPOSE: Exploring the surfaces of cones.

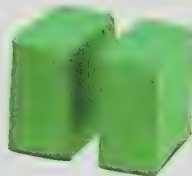
name \_\_\_\_\_

How many flat surfaces  
on this square prism? 6

Cut square prisms in half.

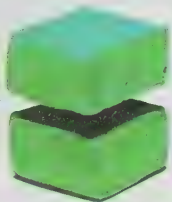


How many  
flat surfaces on  
each piece now?



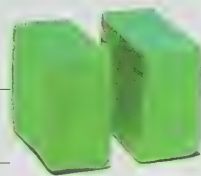
6

6



6

6

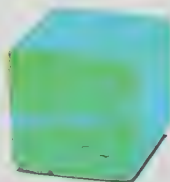


6

6

How many  
flat surfaces?

6



How many  
flat surfaces?

5



**goal** Exploring the surfaces of prisms

**things** knife  
square prisms

**warm-up** Continue working in groups. Provide each group with two square prisms cut from clay or a block of foam rubber or a large cellulose sponge. *This cube has a very special name. It is called a SQUARE PRISM. (Look out! Maybe your solid shape turned out to be a rectangular prism.)* Everyone will need to handle the cube to find the number of flat surfaces before he begins cutting. If the youngsters immediately come up with the right number, disagree and make them prove it to you by numbering each surface.

**page 97** The first question is already answered. Cut one prism in half as pictured for each group. Turn the cut prism to match the three pictures. Let the children explore both pieces to determine the number of flat surfaces on each. Turn the cube in all three positions and count. Complain about always getting the same answer. Listen to **their** reasoning of why this happens.

Cut the second cube in half diagonally. Let the children search for the answer to the last question. *Did you get a different answer? Can you think why?* No conclusions are necessary—just get them thinking. *Does this prism have any surfaces that remind you of a special shape? (Triangle) Can you think of a special name for this prism? (TRIANGULAR PRISM)*

Keep all the pieces. You'll need them again.

**goal** Exploring the surfaces of PYRAMIDS

**things** for each group:  
pyramid

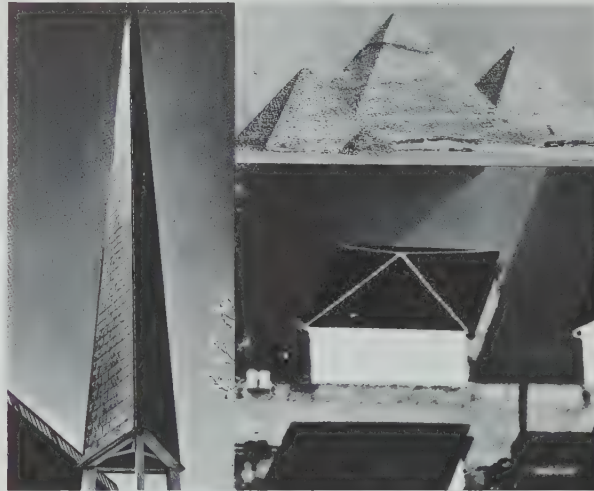
**warm-up** Continue working in groups. Provide each group with a model of a pyramid. (See the upper-grade teachers again.) *What kind of surfaces does this shape have? (Flat) What shapes do the sides have? How many have the shape of a triangle? How many have the shape of a square? Does anyone know the special name of this shape? (Pyramid)*

**page 98** Have you ever seen anything that looked like a pyramid? Discuss the pictures and questions on the page.

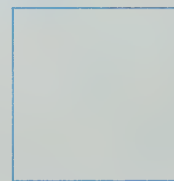
Compare the pyramid with the other solid shapes studied so far. *Is the pyramid like any of them? Which ones? How? How is it different?*

98

## FIND PYRAMID SHAPES



If you tip a pyramid,  
you will see these surfaces.

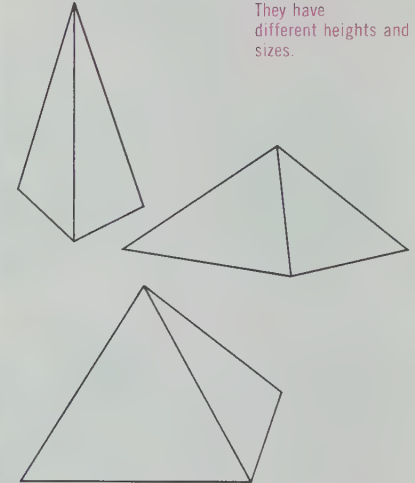


Are there any curved surfaces? No

All have flat surfaces.  
All have corners and edges.  
All come to a point.

How are these alike?  
How are they different?

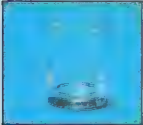

They have  
different heights and  
sizes.



PURPOSE: Exploring the surfaces of pyramids.

name \_\_\_\_\_

Check which shape it's most like.

			✓
	✓		
			✓
			✓
	✓		
		✓	
			✓
	✓		
			✓
		✓	

**goal** Matching real objects to solid geometric shapes

**things** cylinder  
cone  
triangular prism

**warm-up** Work with one model at a time. *What is this shape called? Can you think of anything that looks like a cylinder? Is there anything in this room that has the same shape as this cylinder? (Size is not important now.)*

**page 99** Work together. There are many decisions to be made on this page. *How are they alike?* This is the most important question. Let the youngsters use the solid shapes to help them make their explanations.



**goal** Exploring surfaces, EDGES, and CORNERS of solid geometric shapes

**memo** Understanding of the words can come only with hands-on experience.

**things** prisms—rectangular, triangular, and square  
cylinders  
cones  
spheres

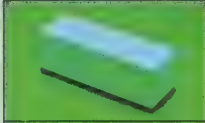
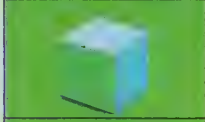
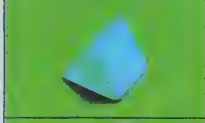

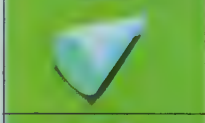

**warm-up** The children must have had the experience of feeling an **edge** before you develop the word. An edge is where two surfaces come together. Have them run a finger along the edge of a table or desk. Watch out for rounded edges. Chair legs, windowsills, books with hard covers, and doors also provide models of an edge.

The concept of a **corner** can be developed informally. *What feels sharp? What feels like a point?* Let the pupils feel the corners of boxes, of books, of tables. *How many surfaces come together at a corner?* (3)

**page 100** Have the children guess answers to the questions by looking at the pictures, and then have them **check** their guesses by counting while handling the real thing.

100

Answer as many as you can.

	How many flat surfaces?	Is there a curved surface?	Do two surfaces meet to form an edge?	Do three edges meet to form a corner?
	6	No	Yes	Yes
	6	No	Yes	Yes
	5	No	Yes	Yes
	2	Yes	Yes	No
	1	Yes	Yes	No
	0	Yes	No	No

PURPOSE: Exploring surfaces, edges, and corners of solid figures.



**things** piece of chalk, board eraser, book, wastepaper basket, milk carton, crayon box, paint jar, paper cup, orange, plastic pie container

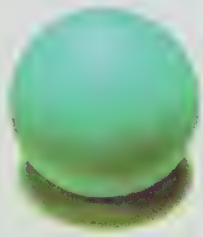
Have the youngsters examine each object and compare the object to the shapes on the page. Which shape is the object most like? Some objects may combine two shapes.

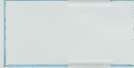

name \_\_\_\_\_

How many  
flat surfaces  
on a ball? 0


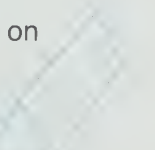
How many  
flat surfaces  
on a box? 6

How many  
curved surfaces on


1


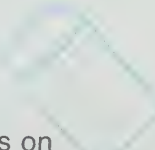
How many  flat surfaces on  4

How many  flat surfaces on  2

How many  flat surfaces on  3

How many  flat surfaces on  2

How many  flat surfaces on  2

How many  curved surfaces on  1

© 1974, SRA

PURPOSE: Exploring the surfaces of solid figures.



**things** boxes, cans, and other real models of the shapes explored in the chapter; paste, paint, string, adhesive tape

Today everyone is an architect. The goal—to design buildings, using the collection of

containers. Paste, string, and tape will help hold the buildings together. Paint will make everything beautiful.

**goal Checkout**—surfaces of solid geometric shapes

**things** for each group:  
spheres (ball)  
rectangular prisms (box)  
triangular prisms (box)  
cylinders (can)

**page 101** Work in groups. Each group will need a set of shapes—either real-world models or those from a set of geometric solids. Use the same technique you used with the preceding page—have them **guess** answers by examining the pictures and then **check** their guesses by manipulating a model.

Having a cardboard box you can cut apart will help the children understand the number of flat surfaces. Removing the top and bottom of a tin can will dramatically illustrate the surfaces of a cylinder. But the sphere is very difficult to demonstrate. Are you brave enough to peel an orange so that the skin comes off in one long strip?

For this chapter's Checkout activity, you'll need at least two different-size models of each of the following shapes: rectangular prism (boxes), sphere (balls), and cylinder (cans).

Work with one pupil at a time. Present the pupil with a set of objects and have him sort them. *How are the balls alike? How are they different? Do you remember the name for this shape?* Repeat these questions for the cans and the boxes. *Show me a flat surface—a curved surface.* Names are not as important as knowing which objects have flat surfaces, which have curved surfaces, and which have both.

# RESOURCES

## additional learning aids

**concept**—chapter objectives 1, 2, 3, and 4

### SRA products

*Mathematics Involvement Program*, SRA (1971)

Cards: 61, 71, 81, 222, 183, 203

*Skill through Patterns, level 2*, SRA (1974)

Spirit master: 6

**other learning aids** (described on page 128f)—

Color & Shape Bingo, Geoboard Activity

Cards, Geoboard Classroom Kit, Soap-film

Shapes

## letter to parents

Dear Parents:

Your youngster has worked very hard over the last weeks in learning the addition and subtraction facts and has made some good progress in problem solving too.

We are going to have a change of pace and go about solving some other kinds of problems. We are going to start looking at the world around us and examining the shapes of things. A box, a ball, and a tin can will be the basis for our geometry study. It's surprising how many manufactured objects have the shape of a cube, a sphere, or a cylinder. We won't be as concerned with the fancy names for the shapes as interested in finding out about flat and curved surfaces.

You will have fun with a new question at home. As you serve a piece of cake or a hunk of cheese, ask "What is this shaped like?" Youngsters usually enjoy putting things into categories, and everyone will have a chance to do so in our geometry study.

We will be going back to our study of numbers in a short time. Your child's addition and subtraction skills will be developing quickly. We will work with numbers as large as 1000 and will be able to solve some good story problems with the large numbers. Don't hesitate to ask your child to read numbers up to 1000 that may appear in signs, advertising, newspapers, or magazines. It will be good for your child to see that the numbers are actually used in the things you are interested in too.

After the hard work with the number skills it will be good to get to some study of measurement. Your child will become acquainted with both centimetres and inches. We won't make a big production out of the metric units of length. Rather we will talk about it as a standard unit of length that we can use to measure, just as we can use the inch to measure. It won't be hard to think about centimetres or inches, but it may be hard to learn to use a measuring stick. Be sure to involve your youngster any time that you have to measure length at home. Measuring does take practice, so your help will be appreciated.

Make a copy of these.

$\begin{array}{r} 9 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 6 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 2 \\ \hline \end{array}$
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$\begin{array}{r} 3 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 0 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 1 \\ \hline \end{array}$



# 5

## EXTENDING ADDITION AND SUBTRACTION SKILLS

before this chapter the learner has —

1. Studied place value for 2-digit numbers
2. Added and subtracted multiples of 10
3. Worked with the number line
4. Ordered and compared 2-digit numbers

in chapter 5 the learner is —

1. Adding and subtracting two 2-digit numbers, no renaming
2. Studying place value for 3-digit numbers
3. Ordering and comparing 3-digit numbers
4. Adding two 3-digit multiples of 100
5. Adding 1, 10, or 100 to a 3-digit number
6. Subtracting 1, 10, or 100 from a 3-digit number
7. Adding three 1-digit numbers
8. Showing that the order in which numbers are added does not change their sum
9. Showing that the way numbers are grouped for addition does not change their sum

in later chapters the learner will —

1. Find the sum and the difference for any two 2-digit numbers with renaming
2. Find the sum (less than 100) for three 2-digit numbers

# Notes & Things

The curtain is ready to rise on the first scene in Act II of the addition and subtraction story. The script for the second scene is in chapter 7, and Act III can be found in chapters 8 and 10.

This seemingly slow development of addition and subtraction skills has brought dramatic results in both years of our prepublication study; youngsters have demonstrated outstanding computational skill achievement. Many teachers believe the reason is simple: The youngsters are expected to know the number facts and time is taken to practice. When place value is coupled with this knowledge, the algorithms just aren't at all difficult.

As you turn the pages of this chapter you will see that none of the problems require renaming; however, the necessary thought processes are presented. Getting the youngsters used to taking one step at a time will take some patience on your part. Here's the sequential presentation.

$$\begin{array}{r|l} \text{tens} & \text{ones} \\ 2 & 0 \text{ (multiple of ten)} \\ + & 5 \\ \hline \end{array}$$

$$\begin{array}{r|l} \text{tens} & \text{ones} \\ 2 & 4 \text{ (any 2-digit number)} \\ + & 5 \text{ but no renaming involved} \\ \hline \end{array}$$

Your questions from the very beginning are:

**How many ones in all?**

**How many tens in all?**

You will ask the same questions as the skill development goes on to this type of problem.

$$\begin{array}{r|l} \text{tens} & \text{ones} \\ 3 & 7 \text{ (any 2-digit number)} \\ + 1 & 0 \text{ (multiple of ten)} \\ \hline \end{array}$$

The take-away notion was used in level 1 as the youngsters were introduced to subtraction. This chapter returns to that idea—you take some number away and then how many remain? You will see a pattern of problems presented in subtraction too.

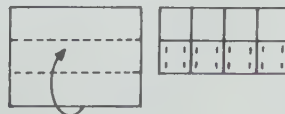
$$\begin{array}{r|l} \text{tens} & \text{ones} \\ 3 & 9 \\ - & 7 \\ \hline \end{array} \quad \begin{array}{r|l} \text{tens} & \text{ones} \\ 3 & 5 \\ - 2 & 0 \\ \hline \end{array}$$

And your two questions will change to:

**How many ones remain?**

**How many tens remain?**

The chapter also extends the place-value concept to include multiples of 100. You will want some new and bigger place-value pocket charts. You will find the pattern for them below. The youngsters are experienced chartmakers by now, so the charts should not cause any problems.



The associative property is explored at the end of the chapter, but its official name is not presented to the children. The pages are such that the youngsters will certainly get the idea that it's O.K. to pick any two of the three numbers to add together first. The use of this idea to help in finding the sum is really all that is important.

## words

The word *parentheses* is the only new concept-development word introduced orally in this chapter and appearing on pupil pages.

## things

ten-trays

counters

groups of hundreds, tens, and ones for each pupil:

place-value charts and numeral cards

100-blocks, 10-strips, and single squares

For the extra activities you will want to have these things available:

spirit master

3 large envelopes

yarn

felt pens of 2 colors

green and white paper

3 same-shape plastic gallon containers

sponges cut into 1-inch cubes

small cards

wood cubes

**goal Survey**—adding and subtracting 1- and 2-digit numbers, no renaming

**memo** Use this page as an informal inventory to help you determine how familiar your pupils are with the skills to be developed in this chapter. Their success or lack of success in finding the errors will serve as a clue to the pace at which you can proceed.

**page 102** Here's everyone's chance to be a helper and check papers. Decide how to mark any mistakes—ring the problem, mark an X, mark a ✓. When directions are clear, everyone works independently.


Talk about the results. *Which problems do you think are wrong? Why are they wrong?* Listen to any explanations the pupils may offer. Don't point out any problems they may have missed. Remember, this is a survey. Assure those who couldn't find the mistakes that they soon will be able to. Their goal for this chapter is to learn to do problems like these.

102


They did not agree. Each person thought he had to do the hardest problems. Look at each of the papers. Did anyone make a mistake? Yes

Who do you think had the hardest problems?


Answers will vary.  
(Why do you think his problems were the hardest?)




$\begin{array}{r} 30 \\ + 2 \\ \hline 32 \end{array}$	$\begin{array}{r} 44 \\ + 20 \\ \hline 64 \end{array}$
$\begin{array}{r} 10 \\ - 3 \\ \hline 8 \end{array}$	$\begin{array}{r} 70 \\ - 3 \\ \hline 67 \end{array}$
	$\begin{array}{r} 56 \\ - 10 \\ \hline 46 \end{array}$



$\begin{array}{r} 50 \\ + 8 \\ \hline 58 \end{array}$	$\begin{array}{r} 83 \\ + 90 \\ \hline 163 \end{array}$
$\begin{array}{r} 10 \\ - 1 \\ \hline 9 \end{array}$	$\begin{array}{r} 80 \\ - 5 \\ \hline 75 \end{array}$
	$\begin{array}{r} 84 \\ - 10 \\ \hline 74 \end{array}$



$\begin{array}{r} 40 \\ + 3 \\ \hline 43 \end{array}$	$\begin{array}{r} 12 \\ + 90 \\ \hline 102 \end{array}$
$\begin{array}{r} 10 \\ - 5 \\ \hline 5 \end{array}$	$\begin{array}{r} 90 \\ - 6 \\ \hline 84 \end{array}$
	$\begin{array}{r} 63 \\ - 10 \\ \hline 53 \end{array}$



$\begin{array}{r} 70 \\ + 4 \\ \hline 74 \end{array}$	$\begin{array}{r} 91 \\ + 20 \\ \hline 111 \end{array}$
$\begin{array}{r} 10 \\ - 4 \\ \hline 6 \end{array}$	$\begin{array}{r} 60 \\ - 7 \\ \hline 63 \end{array}$
	$\begin{array}{r} 98 \\ - 10 \\ \hline 78 \end{array}$

PURPOSE: Extending skills in addition and subtraction.

name \_\_\_\_\_



tens	ones
2	0
+	5
2	5

Add

tens	ones
5	0
+	6
5	6

tens	ones
7	0
+	9
7	9

He had 10.

He borrowed 3 more.

How many did he have? 13

She found 30.

She had 6.

How many did she have? 36

He ate 20.

His sister ate 9.

How many were eaten? 29

There were 50 in one line.

There were 7 in the other.

How many were in line? 57

tens	ones
3	0
+	4
3	4

tens	ones
9	0
+	8
9	8

tens	ones
4	0
+	7
4	7

tens	ones
2	0
+	1
2	1

tens	ones
6	0
+	3
6	3

tens	ones
8	0
+	2
8	2

**goal** Adding ones to a 2-digit multiple of 10**things** for each group:  
2 ten-trays  
29 counters**warm-up** Group your pupils and distribute the materials. *Use your ten-trays and counters to show 20.* Write the following form on the board:

tens | ones

*How many tens? How many ones? Record their replies. Add 3 more counters. How can we write that? How many in all? Complete the recording. Follow the format used on the page. Repeat with other combinations.***page 103** Talk about the answers in the example. *Why aren't any tens recorded when the 5 is added? Have the pupils complete the problems at the left. Check performance before going on to the word problems.*

Read the word problems together to make sure that all the words are understood. As the children work independently circulate and help where needed. If any of the problems prove to be difficult, be sure to have them written in the computation form.



**goal** Adding a 2-digit and a 1-digit number, no renaming

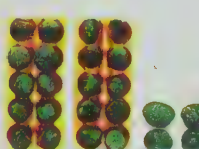
**things** for each group:  
3 ten-trays  
39 counters

**warm-up** Group the youngsters and distribute the materials. Write the tens | ones place-value form on the board. *Show 14.* Did each group use a ten-tray? Record how many on the board. *Why is a 1 written in the tens column? Why is a 4 written in the ones column? Add 3 more counters.* Have this step recorded. *Why is the 3 written in the ones column? How many in all?* Have someone complete the problem on the board. *How many ones? How many tens?* Compare the answer with the counters shown. Repeat for several examples.


**page 104** The warm-up leads right into a discussion of the example shown. Everyone should work independently. Watch for addition-fact errors. Mastery of the facts is a prerequisite for success here. Challenge those who are capable to work the word problems by themselves. Compare answers. Does everyone agree?

104


TAKE



AND ADD



MORE.



tens   ones	
2	4
+	5
29	

tens   ones	
2	2
+	6
28	

tens   ones	
4	5
+	2
47	

tens   ones	
3	4
+	5
39	

tens   ones	
6	2
+	7
69	

tens   ones	
3	6
+	2
38	

tens   ones	
2	8
+	1
29	

tens   ones	
5	4
+	3
57	

tens   ones	
4	2
+	5
47	

tens   ones	
7	1
+	8
79	

tens   ones	
2	0
+	6
26	


tens   ones	
4	3
+	2
45	

23 were there.  
6 more came.  
How many  
in all? 29

11 went away.  
5 more went away.  
How many  
went away? 16

PURPOSE Adding 2-digit and 1-digit numbers with no renaming.

name \_\_\_\_\_

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**goal** Practice in adding a 2-digit and a 1-digit number, no renaming

**page 105** There are too many problems for any one day—2 rows are probably enough. Check performance. Pupils who make no errors are ready to go on. Look for the reasons errors were made. If facts are the cause of the trouble, provide the appropriate practice. Come back to the remaining problems tomorrow.

**goal** Adding a 2-digit number and a 2-digit multiple of 10, no renaming

**things** for each group:  
4 ten-trays  
39 counters  
sheet of paper  
pencil

**warm-up** Continue working in small groups with manipulatives. Each group should select a **secretary**. Write the tens | ones place-value forms on the board. Have the secretary copy this form on the group's paper.

Show 23. How many full ten-trays? How many ones? Decide how to write what you have so that the secretary can write it on your paper. Show 10 more. You're going to add the 10 to the 23. Tell your secretary what to write and where. Have the pupils put the ten-trays together. Now add. Again have the group decide what the secretary is to write. Look at the counters. Look at your answer. Are these the same?

Let's have all the secretaries go to the board and copy exactly what your group decided. Compare results.

**page 106** After the warm-up go directly to the example. Time for everyone to be a secretary. After you finish, draw a ring around the easiest problem with a green crayon and a ring around the hardest problem with a red crayon. Can the children explain the why of their choices?

106



tens	ones
3	7
+	10
4	7

tens	ones
2	6
+	20
4	6

tens	ones
5	3
+	20
7	3

tens	ones
8	8
+	10
9	8

tens	ones
6	2
+	30
9	2

tens	ones
2	9
+	40
6	9

tens	ones
2	5
+	60
8	5

tens	ones
3	5
+	20
5	5

tens	ones
3	5
+	30
6	5

tens	ones
3	5
+	40
7	5

tens	ones
3	5
+	50
8	5

tens	ones
2	7
+	30
5	7

tens	ones
3	7
+	30
6	7

tens	ones
4	7
+	30
7	7

tens	ones
5	7
+	30
8	7

tens	ones
7	7
+	20
9	7

PURPOSE: Adding 2-digit numbers and a multiple of ten.

name \_\_\_\_\_



Dick's dad was a salesman. He had to drive to different towns every day.

He traveled 70 miles Monday morning.  
He went 25 miles Monday afternoon.  
How far on Monday?

95 miles

He went 52 miles Tuesday morning.  
He went 40 miles Tuesday afternoon.  
How far on Tuesday?

92 miles

He went only 12 miles Wednesday morning.  
He went 80 miles Wednesday afternoon.  
How far on Wednesday?

92 miles

He went 35 miles Thursday morning.  
He went 60 miles Thursday afternoon.  
How far on Thursday?

95 miles

He went 24 miles Friday morning.  
He drove 70 miles to get home Friday night.  
How far on Friday?

94 miles

**goal** Using addition to solve word problems

**memo** This is the first of several story situations that feature jobs people have. Take some time out to talk about a salesman's job. *What might a salesman sell? Do all salesmen travel? Are there saleswomen too? Do they do the same type of work? Would you like to be a salesperson? Why?*

**page 107** Make sure everyone knows all the words. Pupils who are capable work independently while you work with the others. Have everyone record the computation. When checking, disagree once or twice so that the computation must be proven. Challenge your most capable pupils to try to figure out about how far Dick's dad traveled in all. Wouldn't it be a surprise if someone could find a good estimated answer? Maybe lots of pupils can tell you on which day(s) he traveled the longest distance.



**goal** Subtraction of a 1-digit number from a 2-digit number, no renaming

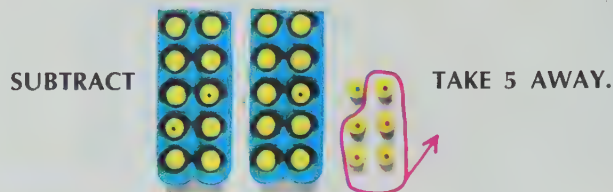
**things** for each group:  
3 ten-trays  
39 counters  
sheet of paper  
pencil

**warm-up** Use the group-secretary technique again. Have the groups duplicate the action for 36 take away 4, and 27 take away 5. *Are you subtracting ones? tens?*

**page 108** Talk about the example. *What kind of problem is this? How do you know? Find the answer.* Pupils who find the correct answer should complete the two rows of problems independently. Get to the root of the trouble with the others. If facts are the culprit, take time to practice before going on.

Make sure everyone knows all the words. Then, everyone on his own. Let those who are capable compute mentally. Check together. If there are any disagreements, have these problems worked on the board.

108



tens	ones
2	6
—	5
2	1



tens	ones
3	9
—	5
3	4

tens	ones
4	5
—	4
4	1

tens	ones
6	8
—	2
6	6

tens	ones
5	7
—	3
5	4

tens	ones
2	4
—	3
2	1

tens	ones
7	6
—	2
7	4

tens	ones
9	8
—	3
9	5

tens	ones
8	9
—	2
8	7

He had 45. He gave 3 away.  
How many remain? 42

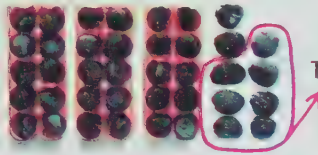
They had 59. They lost 8.  
How many remain? 51

She found 28. She gave 5  
away. How many remain? 23

He bought 25. He took 5  
back. How many remain? 20

PURPOSE: Subtraction practice.

name \_\_\_\_\_



TAKE 7 AWAY.

tens	ones
3	9
—	7
3	2

**SUBTRACT**

tens	ones
7	5
—	2
7	3

tens	ones
3	2
—	1
3	1

tens	ones
8	9
—	6
8	3

tens	ones
4	8
—	6
4	2

tens	ones
2	6
—	4
2	2

tens	ones
6	9
—	3
6	6

tens	ones
4	3
—	2
4	1

tens	ones
9	8
—	4
9	4

tens	ones
5	4
—	4
5	0

tens	ones
2	7
—	6
2	1

tens	ones
6	2
—	2
6	0

tens	ones
3	6
—	3
3	3

77 came in.  
7 went out.

How many remain? 70

29¢ in your pocket.  
4¢ got lost.

How much remains? 25 ¢

39¢ in my pocket.  
1¢ got lost.

How much remains? 38 ¢

**goal** Practice in subtracting a 1-digit number from a 2-digit number, no renaming

**page 109** Talk about the example. Have everyone find the answers independently. Check and work with the pupils who made a mistake. The others should go on independently.

Help with the words in the problems again if necessary.

After checking, talk about the pattern in each problem. *When you subtract, does the number of ones change? Why? Does the number of tens change? Why not?*

**goal** Subtraction of a 2-digit multiple of 10 from a 2-digit number, no renaming

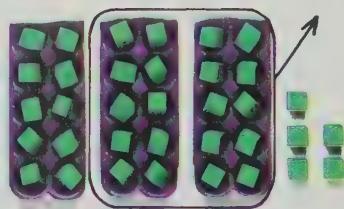
**things** for each group:  
4 ten-trays  
49 counters  
sheet of paper  
pencil

**warm-up** The group-secretary technique should be familiar by now. Have the groups duplicate the action for 47 minus 20, and 36 minus 10. *Are you subtracting ones? tens?* Have each group decide on at least one other problem to present to the other groups to solve.

**page 110** Look at the example together. *What's happening? Find how many remain.* Have the pupils complete another problem or two. Check performance. Continue to help those children who need to see what's happening. Manipulating ten-trays and counters will really help. That's a promise! Let the others complete the page by themselves.

After checking, look for a pattern in these problems. *When you subtracted these problems, did the number of ones change? Why not? Does the number of tens change? Why?*

110



TAKE 20 AWAY.

tens	ones
3	5
- 2	0
1	5

SUBTRACT

tens	ones
3	8
- 1	0
2	8

tens	ones
7	3
- 2	0
5	3

tens	ones
2	6
- 1	0
1	6

tens	ones
9	1
- 6	0
3	1

tens	ones
5	7
- 3	0
2	7

tens	ones
4	5
- 1	0
3	5

tens	ones
8	2
- 5	0
3	2

tens	ones
7	6
- 6	0
1	6

tens	ones
7	7
- 4	0
3	7

tens	ones
8	2
- 6	0
2	2

tens	ones
7	4
- 5	0
2	4

tens	ones
4	9
- 2	0
2	9

tens	ones
6	8
- 3	0
3	8

tens	ones
9	3
- 7	0
2	3

tens	ones
6	1
- 4	0
2	1

You have 55¢. You spend 10¢. How much remains? 45 ¢

PURPOSE: Subtraction practice.

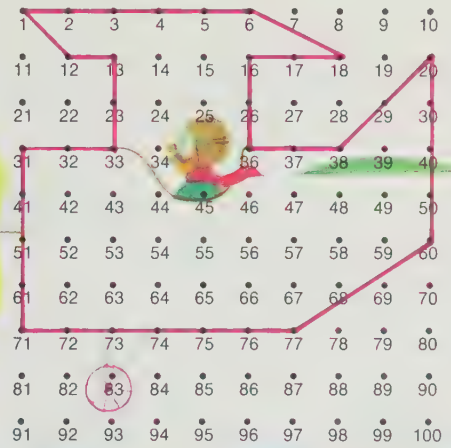
name \_\_\_\_\_

To connect the dots, complete each row of problems below. Start at the dot having the same number as your first answer. Draw a line to the dot for your second answer. Keep going until you reach your last answer.

tens   ones	tens   ones	tens   ones
8   0	3   4	1   1
- 6   0	+ 4	+ 2   5
2   0	3   8	3   6

tens   ones	tens   ones	tens   ones	tens   ones	tens   ones	tens   ones
6   6	9   8	9   6	6   1	1   8	4   3
- 5   0	- 8   0	- 9   0	- 6   0	- 6	- 3   0
1   6	1   8	6	1	1   2	1   3

tens   ones	tens   ones	tens   ones	tens   ones	tens   ones	tens   ones
2   3	3   0	5   1	7   3	2   0	7   0
+ 1   0	+ 1	+ 2   0	+ 4	+ 4   0	- 5   0
3   3	3   1	7   1	7   7	6   0	2   0



**goal Progress Check**—adding and subtracting 1- and 2-digit numbers, no renaming

**page 111** This is a **strange-looking** page! Discuss the directions. Stress that the computations must be done first. Focus on the problems. *Are there any subtraction problems? How do you know? Are there any addition problems? How do you know? What will happen if you forget to look at the sign for each problem?*

After the answers are determined, tackle the connect-the-dot picture. Odds are that it will be a struggle, but there is satisfaction when the job is completed. There will be more pages like this. Taking the time now to make sure everyone understands the procedure will pay off.

Examine all errors. What's that pupil's trouble?

- Did he follow the operation signs?
- Has he mastered the addition facts?
- Has he mastered the subtraction facts?

Any additional practice should focus on the **cause** of the difficulty. If any child does not know the facts by now, more standard practice simply won't help. Let that child have a completed addition table to use. Show how the answer for a subtraction fact can be found, using the same table.

+	0	1	2	3	4	5
0						
1						
2						
3						
4						
5						

The problem: 6-4  
Find the first number (6) in the table.  
Go to the left to find the second number (4).  
Read up to the top to find the answer (2).



See activity 1, page 128a.



See activity 2, page 128a.

A learning crutch is far better than discouragement and failure.



**goal**
Introduction to multiples of 100

**warm-up**
*Do you think you can count all the way to 900? If the children begin counting by ones, let them go a little way. Counting this way will take a long time. There must be a shorter way. Try the ways they think of. Prod until someone mentions counting by hundreds. Then take time for a little oral practice. Now try counting in reverse.*

**page 112**
There's a lot to talk about on this page. Begin with the two big questions at the top. *How can different-size containers each hold 100?*

Focus on the first problem. *How many nails in each box? Can you think of a fast way to count the nails? Count the nails by hundreds. How many hundreds? Help the youngsters record the 3 correctly in the proper place-value boxes. Are there any boxes of 10 pins? How will you show that? Are there any single loose pins? What will you write under ones? How many pins are there?*

Take just as much care with the second problem. With the third problem, challenge pupils to count and record how many stars while you do the same, recording the number so that they cannot see it. Uncover your number and compare the results. If anyone made an error, go back through all the steps. Use the same technique with the last problem—but **you** make a mistake. Have the children explain to you why your answer is wrong.

112

How are these alike?

Same number in each container (100).



How are they different?

Different objects. Different sizes and kinds of containers.

Write how many.



hundreds	tens	ones
3	0	0



hundreds	tens	ones
6	0	0



hundreds	tens	ones
4	0	0



hundreds	tens	ones
8	0	0

PURPOSE: Introduction to multiples of 100.

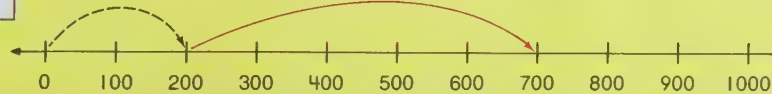


See activity 3, page 128a.

name \_\_\_\_\_

Show the addition on the number line. Complete the sentence.

$200 + 500 =$  700



$300 + 100 =$  400



$600 + 300 =$  900



$100 + 800 =$  900



**goal** Introduction to adding two 3-digit multiples of 100

**memo** By now everyone is familiar with the use of a number line to show addition. But this will be your pupils' first experience with multiples of 100 on the number line. If you anticipate any problems, adapt the warm-up on page 73 and provide this additional experience before using the page with the pupils.

**page 113** *Is this number line different from any you've used before? How?* Read the numbers shown together. If the youngsters are still calling 1000 **ten hundred**, introduce **one thousand** as another name. *Close your eyes. Count from 0 to 1000 by hundreds—no fair looking!*

Work the first problem together. *Everyone try the second problem on your own.* Pupils who have the second problem correct can go on by themselves. Examine the mistakes. Continue to guide those who made mistakes with questions that force them to tell you the next step.

**goal** Practice in adding two 3-digit multiples of 100

**memo** Here's another chance to talk about jobs. *What might a packer pack? Why do things have to be put in boxes? What is a crate? Why would the boxes be put into a crate? Have you been to a grocery store when someone is unpacking a box? Is there more than 1 package in the box? Could that box have been sent in a crate?* Maybe you can borrow a carton of paper clips from the supply room and show all the boxes inside to make things a bit more real.

**page 114** If you prefer, work the word problem first. Don't forget the very last question. It can't be answered until the problem has been finished. Watch for errors on Friday—1110 and 1111 are two possible wrong answers that may appear.

Stress using the number line at the top of the page when unsure of an answer. After checking answers, try some oral practice in adding multiples of 100. This is a sneaky way to reinforce the addition facts.

114



**ADD**

$$200 + 300 = \underline{500}$$

$$100 + 300 = \underline{400}$$

$$100 + 200 = \underline{300}$$

$$400 + 200 = \underline{600}$$

$$300 + 200 = \underline{500}$$

$$300 + 100 = \underline{400}$$

$$200 + 100 = \underline{300}$$

$$200 + 400 = \underline{600}$$

Sam's dad was a packer. His job was to pack 100 boxes into a crate. He was proud of his work. He wanted to improve his record of 1000 crates in one day. Here is his record for one week. Find out if he broke his record.



	morning	afternoon	in all
Monday	400	500	900
Tuesday	200	600	800
Wednesday	500	400	900
Thursday	500	500	1000
Friday	500	600	1100

What do you think happened on Tuesday?

PURPOSE: Adding multiples of 100.

name \_\_\_\_\_

TAKE   AND ADD  200 + 100

**ADD**

hundreds	tens	ones
2	0	0
+ 1	0	0
3	0	0

hundreds	tens	ones
2	0	0
+ 4	0	0
6	0	0

hundreds	tens	ones
5	0	0
+ 3	0	0
8	0	0

hundreds	tens	ones
5	0	0
+ 4	0	0
9	0	0

hundreds	tens	ones
6	0	0
+ 3	0	0
9	0	0

hundreds	tens	ones
4	0	0
+ 5	0	0
9	0	0

hundreds	tens	ones
7	0	0
+ 2	0	0
9	0	0

hundreds	tens	ones
1	0	0
+ 5	0	0
6	0	0

hundreds	tens	ones
8	0	0
+ 1	0	0
9	0	0

The store needed 300 pennies for change one day.  
It needed 500 pennies for change the next day.  
How many pennies did it need for both days? 800

© 1974, SRA

PURPOSE: Adding multiples of 100.

**goal** Practice in adding two 3-digit multiples of 100, sum less than 1000

**page 115** *What's happening on this page?*  
Talk about the example. *Everyone find how many in all.* Check results. Assign the first two problems. Check progress. Those who made no mistakes can go on by themselves. Continue to guide the others. As a pupil gains confidence, move him into the independent group. Addition facts are the most likely cause for any trouble.

Take time to talk about the last word problem. **Why** would a store need that many pennies? Take opportunities such as this to get the youngsters more involved in the everyday situations all around them.



A simple game to provide practice with mental computation.

Leader: *I'm thinking of two numbers whose sum is 700. Can you guess what the numbers are?*

Pupil: *Are they 100 and 600?*

Leader: *100 and 600 are 700, but I am not thinking of these numbers.*

Pupil: *Are you thinking of 300 and 400?*  
The pupil who guesses the correct numbers becomes the new leader.



**goal** Application of adding two 3-digit multiples of 100, sum less than 1000

**memo** Here's still another job to talk about. This should be fun. You'll probably get to hear about everyone's moving-day experiences.

**page 116** The reading abilities of your pupils will determine how you handle this page. Don't let reading stand in the way of success in math. Check any disagreements with answers by having the computation done on the board or on a transparency for the overhead projector.

116

Chair weighs 100 pounds.

Sofa weighs 300 pounds.

How much in all?

400

Washer weighs 300 pounds.

Dryer weighs 300 pounds.

How much in all?

600

Refrigerator weighs 300 pounds.

Stove weighs 200 pounds.

How much in all?

500

Bunk beds weigh 200 pounds.

Chest weighs 100 pounds.

How much in all?

300

Dresser weighs 200 pounds.

Bed weighs 200 pounds.

How much in all?

400

## MOVING DAY

The movers came to give the costs for moving. They estimated the weight of the furniture.



Cupboard weighs 100 pounds.

Table weighs 100 pounds.

How much in all?

200

Packed books weigh 300 pounds.

Packed dishes weigh 100 pounds.

How much in all?

400

TV set weighs 100 pounds.

Piano weighs 500 pounds.

How much in all?

600

PURPOSE: Practice in adding multiples of 100.

name \_\_\_\_\_

Use the head of an arrow to point to the lesser number.

150 > 140      100 < 101      90 < 190

Remember what you say when you read the symbol.

50 is less than 59      199 is greater than 189

50 < 59      199 > 189

Write > or < in the ring.

550 > 505      330 < 333      610 > 601

880 < 890      400 > 399      123 < 321

Arrange each set of numbers from least to greatest.

521   399					
758   476   606	<u>399</u>	<u>476</u>	<u>521</u>	<u>606</u>	<u>758</u>
101   990					
909   590   950	<u>101</u>	<u>590</u>	<u>909</u>	<u>950</u>	<u>990</u>

**goal** Ordering and comparing 3-digit numbers

**warm-up** Review the > and < symbols by writing on the board:

46 is \_\_\_\_\_ than 64      292 is \_\_\_\_\_ than 229  
46 ○ 64      292 ○ 229

Have pupils fill in the blanks and make the appropriate symbol inside the circle.

Now write the following numerals on the board:

576      476      756  
357      567

Have the numbers read aloud, then have pupils order the numbers from least to greatest.

**page 117** *What will you do with this page?*

Talk about the directions. Check any errors with the relation symbols by having the pupil complete the statement verbally.

Determine the pupil's trouble:

- Does he have a concept of the quantities involved?
- Is he confused by place value?
- Is he confused by the direction of the symbols?

**goal** Introduction to 3-digit numerals with no zero digits

**memo** Sheets containing an array of 2-cm squares will provide the youngsters with a good counting aid. Cut out 10-by-10 blocks of 100 squares, 1-by-10 strips of 10 squares, and single squares.

**things** for each pupil:  
place-value chart  
numeral cards  
100-blocks, 10-strips, single squares

**warm-up** *With your squares, show 100 the quickest way possible. How can you show that in your place-value chart? Check the charts after each step. Now add 20. What is the fastest way? How many strips of 10? Show that in your charts. Add 3 more. How many ones did you use? Show that in your chart. Read the number aloud. Work for **one hundred twenty-three**. Remember, **and** is used to read a decimal. Check the number recorded by counting the squares—100, 110, 120, 121, 122, 123. Repeat for several examples, then switch technique. Display a number for the youngsters with manipulatives. Have them record how many in their charts.*

**page 118** *What are you going to do on this page? Concentrate on writing how many first. Make the ring and the check last. Watch out for the last one!*

118

WRITE  
HOW  
MANY

Ring the picture that shows the greatest number of pins. Put a check beside the picture that shows the least number of pins.

PURPOSE: Using place value to understand 3-digit numbers.

	hundreds	tens	ones
	3	4	5
	4	8	3
	6	2	9
	8	5	0
	7	7	6
	3	0	7

name \_\_\_\_\_

Write ten less.

hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones
1	4	1	1	5	1	1	6	1
3	3	6	3	4	6	3	5	6
4	9	9	5	0	9	5	1	9
2	7	3	2	8	3	2	9	3

Write ten more.

**goal** Development of place-value patterns for 3-digit numerals.

**things** for each pupil:  
place-value chart  
numeral cards  
100-blocks, 10-strips, single squares

**warm-up** Use your squares. Show 234. How many hundreds? Show that in your place-value charts. Continue for tens, then ones. Now add 1 more 10-strip. Will you have to change your chart? Which place did you change? How many squares all together? Read the number aloud. Continue in the same manner. Have the children add 100, add another 100, add another 10, remove 100, remove 10, remove 10, remove 100. Emphasize by asking which position changes each time 10 or 100 is added or subtracted. Practice until the youngsters catch on to what happens when.

Write one hundred less.

hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones
6	7	7	7	7	7	8	7	7
3	3	2	4	3	2	5	3	2
5	5	6	6	5	6	7	5	6

Write one hundred more.

**page 119** The format of the page emphasizes order—before, after, and the number between. When directions are clear, everyone should work on his own. But don't be surprised if a few get lost. Check on progress. If any pupils are having trouble, they need more warm-up experiences.



**goal** Development of place-value patterns for 3-digit numbers

**memo** Your goal is to lead your pupils to discover how a change of 1 one, 1 ten, and 1 hundred can affect a number—the importance of place value. This can be accomplished most easily by having them work with manipulatives so that they can see the actual changes being made. Seeing the number of squares involved when 352 changes to 452 is dramatic.

**things** for each pupil:  
place-value chart  
numeral cards  
100-blocks, 10-strips, single squares

**page 120** Take plenty of time to display counters for each problem, show the change in the place-value chart, and then record this change on the page.

*Use squares. Show 257. Record in the place-value charts.*

*Add 1 square to your counters. Have pupils change their charts and record the number on the page. Go back to showing 257 with squares. This time let's add 10. Change the charts and record the number on the page. Compare with adding 1. Back to 257 counters. Now add 100. Compare with adding 1 and with adding 10. When do you get the largest number—when you add 1, when you add 10, or when you add 100?*

120

**add**

$$257 + 1 = \underline{258}$$

$$518 + 1 = \underline{519}$$

$$670 + 1 = \underline{671}$$

$$257 + 10 = \underline{267}$$

$$518 + 10 = \underline{528}$$

$$670 + 10 = \underline{680}$$

$$257 + 100 = \underline{357}$$

$$518 + 100 = \underline{618}$$

$$670 + 100 = \underline{770}$$

**SUBTrAct**

$$438 - 1 = \underline{437}$$

$$863 - 1 = \underline{862}$$

$$745 - 1 = \underline{744}$$

$$438 - 10 = \underline{428}$$

$$863 - 10 = \underline{853}$$

$$745 - 10 = \underline{735}$$

$$438 - 100 = \underline{338}$$

$$863 - 100 = \underline{763}$$

$$745 - 100 = \underline{645}$$

PURPOSE: Working with patterns in addition and subtraction.

name \_\_\_\_\_

Add

$$\begin{array}{|c|c|c|} \hline 3 & 2 & 1 \\ \hline + & & 1 \\ \hline 3 & 2 & 2 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 3 & 2 & 1 \\ \hline + & 1 & 0 \\ \hline 3 & 3 & 1 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 3 & 2 & 1 \\ \hline + & 1 & 0 & 0 \\ \hline 4 & 2 & 1 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 5 & 2 & 2 \\ \hline + & & 1 \\ \hline 5 & 2 & 3 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 5 & 2 & 2 \\ \hline + & 1 & 0 \\ \hline 5 & 3 & 2 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 5 & 2 & 2 \\ \hline + & 1 & 0 & 0 \\ \hline 6 & 2 & 2 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 1 & 7 & 0 \\ \hline + & & 1 \\ \hline 1 & 7 & 1 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 1 & 7 & 0 \\ \hline + & 1 & 0 \\ \hline 1 & 8 & 0 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 1 & 7 & 0 \\ \hline + & 1 & 0 & 0 \\ \hline 2 & 7 & 0 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 6 & 2 & 0 \\ \hline + & & 1 \\ \hline 6 & 2 & 1 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 7 & 0 & 3 \\ \hline + & 1 & 0 \\ \hline 7 & 1 & 3 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 9 & 7 & 5 \\ \hline + & 1 & 0 & 0 \\ \hline 1 & 0 & 7 & 5 \\ \hline \end{array}$$

Subtract

$$\begin{array}{|c|c|c|} \hline 4 & 6 & 4 \\ \hline - & & 1 \\ \hline 4 & 6 & 3 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 4 & 6 & 4 \\ \hline - & 1 & 0 \\ \hline 4 & 5 & 4 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 4 & 6 & 4 \\ \hline - & 1 & 0 & 0 \\ \hline 3 & 6 & 4 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 7 & 6 & 3 \\ \hline - & & 1 \\ \hline 7 & 6 & 2 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 7 & 6 & 3 \\ \hline - & 1 & 0 \\ \hline 7 & 5 & 3 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 7 & 6 & 3 \\ \hline - & 1 & 0 & 0 \\ \hline 6 & 6 & 3 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 1 & 1 & 1 \\ \hline - & & 1 \\ \hline 1 & 1 & 0 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 1 & 1 & 1 \\ \hline - & 1 & 0 \\ \hline 1 & 0 & 1 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 1 & 1 & 1 \\ \hline - & 1 & 0 & 0 \\ \hline & & 1 & 1 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 6 & 8 & 1 \\ \hline - & & 1 \\ \hline 6 & 8 & 0 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 5 & 1 & 8 \\ \hline - & 1 & 0 \\ \hline 5 & 0 & 8 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline 1 & 5 & 0 \\ \hline - & 1 & 0 & 0 \\ \hline & & 5 & 0 \\ \hline \end{array}$$



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PURPOSE: Checkout—addition and subtraction.

**goal Checkout**—addition and subtraction, with emphasis on place value

**things** groups of hundreds, tens, ones  
for display  
for each pupil:  
place-value chart  
numeral cards

**warm-up** Make sure your display materials are large enough for everyone to see. Display 123. Show how many in your charts. Careful, don't let me trick you. Add a 10. Show how many in your charts. Continue by adding 100, taking away 1, adding 10, adding 1, adding another 100, taking away 10, and taking away 100. Check the pupils' charts after each change.

**page 121** Do you see anything different about this page? (The place-value names have disappeared.) Will that make any difference when you work the problems? Do you see any patterns in the problems? Why does the tape say to look out? Everyone should work the problems independently. Examine any errors. Look out for these causes:

- Addition or subtraction facts are not mastered.
- Pupil did not follow the operation sign. (Do those problems again.)
- Pupil did not focus on place value when adding or subtracting 1, 10, or 100. (Provide more practice with manipulatives and place-value charts.)

See activity 4, page 128a.



See activity 5, page 128b.

**goal** Review of number relations and order of numbers

**memo** This extension of the chapter will give you time to work with the stragglers.

**warm-up** Write on the chalkboard:

\_\_\_\_\_ 699 \_\_\_\_\_  
 \_\_\_\_\_ 510 \_\_\_\_\_  
 \_\_\_\_\_ 888 \_\_\_\_\_  
 \_\_\_\_\_ 400 \_\_\_\_\_

When you count, what number comes just before 699? Have a child write the answer. How did you figure that out? What number comes right after 699? Have the answer recorded. How did you figure that out? Continue for the remaining examples.

Go back to the first example. Make two blanks after 700 and then write 703. (698 699 700 \_\_\_\_\_ 703) What numbers are between 700 and 703? Do the same for the other examples.

Write on the board:

\_\_\_\_\_ is less than \_\_\_\_\_ is greater than  
 Choose two children to make the appropriate symbols below the phrases.

**page 122** What's this page all about? What are the rings for? Make sure everyone understands directions.

122

**What comes before and after?**

108	109	110	248	249	250
319	320	321	399	400	401
598	599	600	665	666	667

**What numbers are missing?**

798	799	<u>800</u>	<u>801</u>	<u>802</u>	803
849	<u>850</u>	<u>851</u>	<u>852</u>	<u>853</u>	854
<u>988</u>	<u>989</u>	990	<u>991</u>	992	<u>993</u>

123 + 10  123 - 10

149 - 1  149 - 10


135 + 10  146 - 10

211 + 100  311 - 10

**Write  
> or <  
in the ring.**

480 + 10  490 - 1

150 + 10  160 + 1

100 - 100  10 - 1

600 - 100  500 + 100

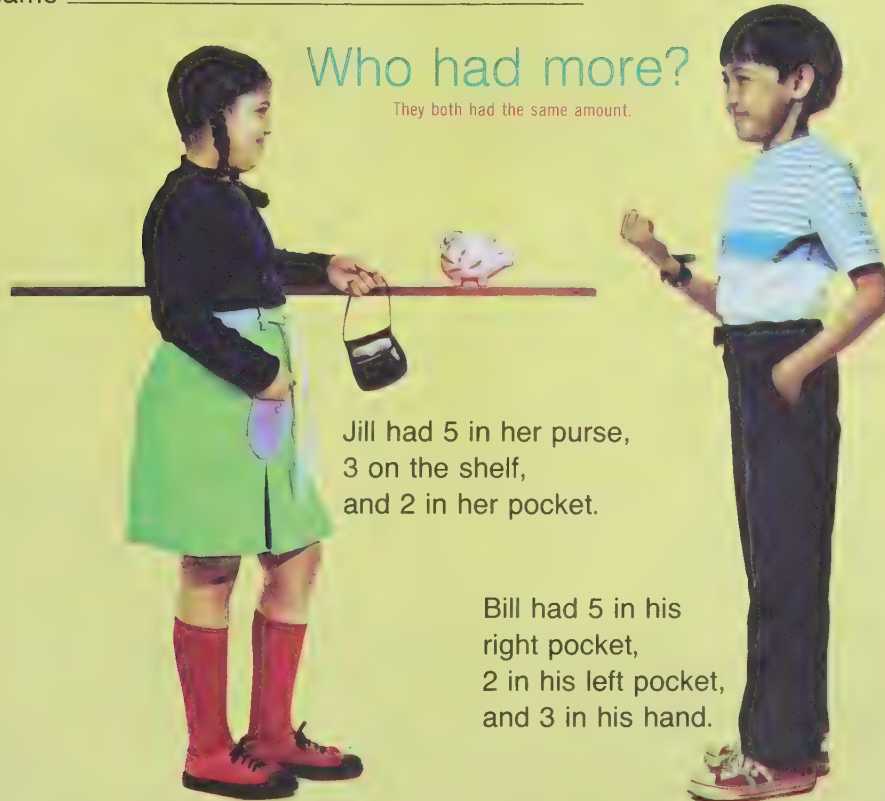
555 + 100  555 - 100

PURPOSE: Review of relations and order of numbers.

name \_\_\_\_\_

## Who had more?

They both had the same amount.



Jill had 5 in her purse,  
3 on the shelf,  
and 2 in her pocket.

Bill had 5 in his  
right pocket,  
2 in his left pocket,  
and 3 in his hand.

**goal** Introduction to adding three 1-digit addends

**memo** The remainder of this chapter provides opportunities to simplify computation by using the associative and commutative properties of addition. These properties will not be named on the page.

**page 123** Have the children read the page silently. Make sure they know all the words. *What's the question? What could each person have?* Talk about how to find out how much each person has. Could the number Jill has in her purse be added to the number on the shelf first and then could the number in her pocket be added? Would it make a difference if the number on the shelf were added to the number in her pocket first and the number in her purse added later? Consider at least two possibilities for finding how much Bill has also.

Challenge the youngsters to find an answer to the question and to think of a way to prove their answer. They can use any materials in the room or draw pictures. **But**, the proof must show that the answer is correct. From this activity and the discussion everyone should see the associative and commutative properties at work. These properties can remain nameless.



**goal** Introduction of PARENTHESES to show grouping for addition

**page 124** Work through this page together step by step. If there seems to be any confusion, count out sets of objects such as wood cubes and join the sets in the two ways presented on the page. Count the results for each way to find that the answer is the same.

**Parentheses** is a big grownup word for little people. It will be harder for them to say the word than to learn to use the symbols. All that is important is that they know the symbols have a special name and what the symbols mean. Let the youngsters figure out what parentheses do and tell you their conclusions.

124



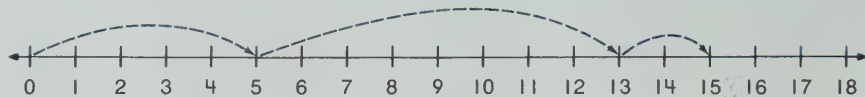
The number line shows  $6 + 4 + 3$ .

You can add  $6 + 4 + 3$

**OR**

you can add  $6 + 4 + 3$ .

$10 + 3 = 13$  IS THE ANSWER THE SAME? Yes  $6 + 7 = 13$



This number line shows  $5 + 8 + 2$ .

You can add  $(5 + 8) + 2$

**OR**

you can add  $5 + (8 + 2)$ .

$13 + 2 = 15$  IS THE ANSWER THE SAME? Yes  $5 + 10 = 15$

There are new symbols used in the last problem.

$(5 + 8) + 2$  or  $5 + (8 + 2)$

$( )$  are called parentheses.

What work do parentheses do?

Show which numbers to add first.

PURPOSE: Introduction to the grouping symbol.

name \_\_\_\_\_

Talk about these  
addition problems.

$$(3 + 7) + 5 = \underline{15}$$

$$3 + (7 + 5) = \underline{15}$$

$$(3 + 5) + 7 = \underline{15}$$

How were the three  
problems alike?

Same numbers. Same answers.

How were they different?

Grouped differently.

$$(8 + 2) + 6 = \underline{16}$$

$$6 + (2 + 8) = \underline{16}$$

$$(2 + 6) + 8 = \underline{16}$$

How were these alike?

Same numbers. Same answers.

How were they different?

Grouped differently.

$$(5 + 1) + 9 = \underline{15}$$

$$1 + (9 + 5) = \underline{15}$$

$$(9 + 1) + 5 = \underline{15}$$

How were these alike?

Same numbers. Same answers.

How were they different?

Grouped differently.

**LOOK!**

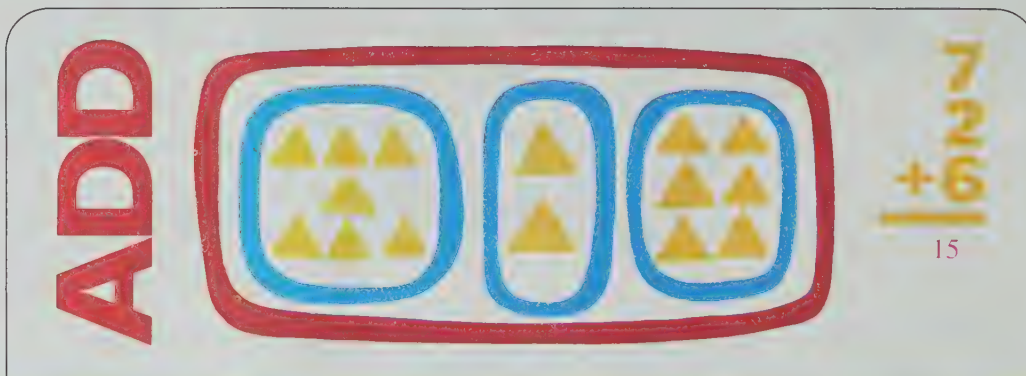
4	5	No parentheses.
5	4	Can you still find
+ 6	+ 6	an answer?    Yes
<u>15</u>	<u>15</u>	

Does it matter which pair  
of numbers you add first?    No**goal** Introduction to grouping numbers in  
any order for addition**memo** The commutative property deals  
with the order in which numbers are  
added, while the associative property deals  
with which numbers are first grouped  
together when three or more numbers are  
added. These two properties are combined  
on this page. Pupils need not learn such  
technical names; they should simply be  
aware that the **order** of the numbers may be  
changed and the **grouping** of numbers may  
also be changed without changing the  
answer.**page 125** Take your cue from the page—  
talk about these addition problems. Compare  
the three sentences for each problem. *Did  
any numbers move? Did only the parentheses  
move? Were both numbers and the  
parentheses moved? Which sentence makes it  
easiest for you to find the answer? (Answers  
will vary.) Why do you think so? When  
the numbers are written in a column, why  
aren't parentheses needed?*

**goal** Practice with addition of three 1-digit numbers

**page 126** Focus attention on the example. Which two numbers shall we add together first? (Answers will vary.) Try all the ways suggested. Is the answer the same each way? Everyone works the problems independently. When checking, ask what two numbers the child added together first. Grouping two addends to obtain a sum of 10 **may not** be the easiest way for the child who has complete mastery of the addition facts. For others this technique can be helpful.

126



$\begin{array}{r} 4 \\ 3 \\ + 7 \\ \hline 14 \end{array}$	$\begin{array}{r} 5 \\ 5 \\ + 5 \\ \hline 15 \end{array}$	$\begin{array}{r} 4 \\ 5 \\ + 6 \\ \hline 15 \end{array}$	$\begin{array}{r} 3 \\ 4 \\ + 7 \\ \hline 14 \end{array}$	$\begin{array}{r} 9 \\ 3 \\ + 6 \\ \hline 18 \end{array}$
$\begin{array}{r} 8 \\ 4 \\ + 6 \\ \hline 18 \end{array}$	$\begin{array}{r} 7 \\ 5 \\ + 3 \\ \hline 15 \end{array}$	$\begin{array}{r} 6 \\ 6 \\ + 6 \\ \hline 18 \end{array}$	$\begin{array}{r} 8 \\ 0 \\ + 9 \\ \hline 17 \end{array}$	$\begin{array}{r} 7 \\ 6 \\ + 1 \\ \hline 14 \end{array}$

PURPOSE: Adding three 1-digit numbers.

name \_\_\_\_\_

4	3	6	8	8
8	9	5	3	3
$+ 3$	$+ 4$	$+ 7$	$+ 6$	$+ 4$
15	16	18	17	15

7	9	3	6	5
5	4	4	3	7
$+ 6$	$+ 3$	$+ 8$	$+ 8$	$+ 6$
18	16	15	17	18

8	4	6	3	4
4	3	7	8	3
$+ 3$	$+ 9$	$+ 5$	$+ 6$	$+ 8$
15	16	18	17	15

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PURPOSE: Adding three numbers.

**15**

Find the dots below  
all problems with 15  
as an answer.

Connect these dots  
with lines.

How are these  
problems alike?

Same numbers. Same answers.

How are they different?

Grouped differently.

**18**

Find the dots below  
all problems with 18  
as an answer.

Connect these dots  
with lines.

How are these  
problems alike?

Same numbers. Same answers.

How are they different?

Grouped differently.

**goal** Practice with addition of three  
1-digit numbers

**things** for each pupil:  
crayons of 2 colors

**page 127** Have the children find the sums  
independently first. Next check their  
answers and have them rework any  
problems that are wrong. A wrong answer  
will affect completion of the page.

Talk about the directions given on the right  
side of the page. Have the pupils use  
crayons of one color to connect sums of 15,  
and crayons of another color to connect  
sums of 18. Everyone's ready to answer the  
questions now. The outcome may be  
surprising to some youngsters.



**goal** Solving word problems involving three addends; **Progress Check**—adding three 1-digit numbers

**page 128** Do have fun with this page. Do it together. Anyone who can't spell the word to answer the "What do they have?" question should draw a picture instead. Have each problem read aloud when checking.

Use the problems in the column at the right as a Progress Check. Everyone should work independently. Talk about the results. *Do you notice anything special about these problems? How many different problems do you really have? (Only three) Why?*

128

The pencil has 1. The pin has 1. The tack has 1.  
How many in all? **3** What do they have? Sharp points

$$(5 + 4) + 1 = \underline{10}$$

The jacket has 6. The skirt has 1. The blouse has 5.  
How many in all? **12** What do they have? Buttons

$$(4 + 1) + 5 = \underline{10}$$

The cat has 4. The bug has 6. The fish has 0.  
How many in all? **10** What do they have? Legs

$$(1 + 5) + 4 = \underline{10}$$

The corn plant has 1. The boy has 2. The rabbit has 2.  
How many in all? **5** What do they have? Ears

$$(3 + 2) + 4 = \underline{9}$$

The chair has 4. The stool has 3. The table has 4.  
How many in all? **11** What do they have? Legs

$$(2 + 4) + 3 = \underline{9}$$

The triangle has 3. The circle has 0. The square has 4.  
How many in all? **7** What do they have? Corners

$$(4 + 3) + 2 = \underline{9}$$

$$(2 + 6) + 1 = \underline{9}$$

Don has 2. Jon has 2. Ron has 2.  
How many in all? **6** What do they have? Answers will vary.  
Examples: ears, arms, eyes, and so on.

$$(6 + 1) + 2 = \underline{9}$$

$$(1 + 2) + 6 = \underline{9}$$

PURPOSE: Adding in story situations.

Progress check



things counters

If concept is the problem, try this. *Show a set of 2, a set of 6, and a set of 5. How many sets? (3) Move two sets together. How many in your new set? (7, 8, or 11) Lead the youngster to count from that number to find how many in all.*



See activity 6, page 128b.

# RESOURCES

## another form of evaluation

for progress check—page 111

Complete each row.  
Be careful!

$\begin{array}{r} 50 \\ +20 \\ \hline 70 \end{array}$	$\begin{array}{r} 76 \\ -20 \\ \hline 56 \end{array}$	$\begin{array}{r} 43 \\ +30 \\ \hline 73 \end{array}$	$\begin{array}{r} 59 \\ -40 \\ \hline 19 \end{array}$	$\begin{array}{r} 80 \\ -50 \\ \hline 30 \end{array}$
$\begin{array}{r} 23 \\ +32 \\ \hline 55 \end{array}$	$\begin{array}{r} 19 \\ -7 \\ \hline 12 \end{array}$	$\begin{array}{r} 70 \\ +6 \\ \hline 76 \end{array}$	$\begin{array}{r} 63 \\ +6 \\ \hline 69 \end{array}$	$\begin{array}{r} 26 \\ -10 \\ \hline 16 \end{array}$
$\begin{array}{r} 57 \\ -50 \\ \hline 7 \end{array}$	$\begin{array}{r} 84 \\ +3 \\ \hline 87 \end{array}$	$\begin{array}{r} 44 \\ +44 \\ \hline 88 \end{array}$	$\begin{array}{r} 39 \\ -30 \\ \hline 9 \end{array}$	$\begin{array}{r} 35 \\ -20 \\ \hline 15 \end{array}$

for checkout—page 121

Add.			Subtract.		
$\begin{array}{r} 345 \\ +1 \\ \hline 346 \end{array}$	$\begin{array}{r} 345 \\ +10 \\ \hline 355 \end{array}$	$\begin{array}{r} 345 \\ +100 \\ \hline 445 \end{array}$	$\begin{array}{r} 121 \\ -1 \\ \hline 120 \end{array}$	$\begin{array}{r} 121 \\ -10 \\ \hline 111 \end{array}$	$\begin{array}{r} 121 \\ -100 \\ \hline 21 \end{array}$
$\begin{array}{r} 444 \\ +1 \\ \hline 445 \end{array}$	$\begin{array}{r} 444 \\ +10 \\ \hline 454 \end{array}$	$\begin{array}{r} 444 \\ +100 \\ \hline 544 \end{array}$	$\begin{array}{r} 235 \\ -1 \\ \hline 234 \end{array}$	$\begin{array}{r} 235 \\ -10 \\ \hline 225 \end{array}$	$\begin{array}{r} 235 \\ -100 \\ \hline 135 \end{array}$
$\begin{array}{r} 721 \\ +1 \\ \hline 722 \end{array}$	$\begin{array}{r} 721 \\ +10 \\ \hline 731 \end{array}$	$\begin{array}{r} 721 \\ +100 \\ \hline 821 \end{array}$	$\begin{array}{r} 343 \\ -1 \\ \hline 342 \end{array}$	$\begin{array}{r} 343 \\ -10 \\ \hline 333 \end{array}$	$\begin{array}{r} 343 \\ -100 \\ \hline 243 \end{array}$
Look out!					
$\begin{array}{r} 470 \\ +1 \\ \hline 471 \end{array}$	$\begin{array}{r} 603 \\ +10 \\ \hline 613 \end{array}$	$\begin{array}{r} 924 \\ +100 \\ \hline 1024 \end{array}$	$\begin{array}{r} 421 \\ -1 \\ \hline 420 \end{array}$	$\begin{array}{r} 313 \\ -10 \\ \hline 303 \end{array}$	$\begin{array}{r} 170 \\ -100 \\ \hline 70 \end{array}$

for progress check—page 128

$$\begin{array}{l} (3+2)+5 = \frac{10}{10} \\ (5+3)+2 = \frac{10}{10} \\ (2+5)+3 = \frac{10}{10} \\ \\ (2+1)+7 = \frac{10}{10} \\ (1+7)+2 = \frac{10}{10} \\ (7+2)+1 = \frac{10}{10} \\ \\ (2+4)+5 = \frac{11}{11} \\ (2+5)+4 = \frac{11}{11} \\ (5+4)+2 = \frac{11}{11} \end{array}$$

## activities

### 1. things spirit master

Trace a drawing with large parts onto the spirit master. Write a problem similar to those on the page in each part of the drawing. At the bottom of the page write directions like these:

- Color all parts with 3 ones in the answer orange.
- Color all parts with 2 tens in the answer green.

### 2. things 3 large envelopes, yarn, felt pen, green and white paper, 3 lists of problems

Make three moneybags by labeling one envelope 25¢, another \$1.00, and the last \$5.00. Attach yarn to each envelope so that the moneybag can be worn around a child's neck. Make paper money to correspond to the denominations written on each bag, or use play money. Prepare 3 lists of problems similar to those on the page. Make the easiest problems 25¢ questions, those of average difficulty \$1.00 questions, and the hardest ones \$5.00 questions. Place the money and lists in the appropriate bags.

Choose three children—one for each moneybag—and a leader. Divide the remaining players into 2 teams. The leader asks the first member on one team what priced question he

would like, draws a question from the appropriate envelope, and reads the question. If the question is answered correctly, the player is given the amount of money he won. Now it is the other team's turn. The team with the most money at the end of the game wins.

### 3. things 3 same-shape plastic gallon containers, felt pen, sponges cut into 1-inch cubes

Cut the tops off the containers so that all three are the same height. Label one container **hundreds**, another **tens**, and the last **ones**. Have the containers lined up in the correct place-value positions. Mark a line 3 feet from the containers. Form two teams of three players each.

Each player tosses 10 sponge cubes one at a time, trying to get as many as possible into the containers. When a player has tossed all his sponges, he records the number of hundreds, tens, ones on the board and then tries to read the number formed. One point is earned for recording the number correctly and another for reading it correctly. Teams alternate. An extra point can be earned in each round by the team that forms the greater number. When all players have had a turn, the team with more points wins.

### 4. things Sets of 100, of 10, and loose ones; individual place-value charts and number cards

Have the pupil show 134 with manipulatives. *Show how many on your place-value chart. Add 1 counter. Show how many on your chart. Add a ten. Show how many on the chart. Add a hundred. Now how many?* Have the pupil show each step with manipulatives first and then record how many in the place-value chart. Work on subtracting 1, 10, and 100 also.

**5. things** small cards, felt pens of 2 colors, counters, individual place-value charts and numeral cards

Two decks of cards are needed. Use a pen of a different color to prepare each deck. Write a different 3-digit numeral on each card to form one deck. Make an equivalent number of cards, each with one of these directions, to form the other deck:

+1	−1
+10	−10
+100	−100

Each deck is shuffled separately and placed facedown in a stack. The players take turns drawing a card from each stack and showing the answer with numeral cards on a place-value chart. One counter is earned for each correct answer. One counter is returned for each error. The player with the most counters wins.

**6. things** for each group: 3 wood cubes, counters

Label the faces of the cubes as follows:

- 1, 2, 3, 4, 5, 6
- 4, 5, 6, 7, 8, 9
- 0, 1, 2, 3, 4, 5

The counters are used to keep score. In turn each player rolls the cubes and adds the 3 faceup numbers—in any order. One counter is earned for a correct answer, one counter is returned for an error. The player with the most counters wins.

## additional learning aids

**notation**—chapter objective 2

### SRA products

*Mathematics Involvement Program*, SRA (1974)

Card: 114

*Skill through Patterns, level 2*, SRA (1974)

Spirit master: 48

*Visual Approach to Mathematics, level 2*, SRA (1967)

Visual: 3

**other learning aid** (described on page 128f)—  
Flip-A-Strip Place Value Chart

**operation**—chapter objectives 1, 3, 4, 5, 6, 7, 8, and 9

### SRA products

*Arithmetic Fact Kit*, SRA (1969)

Addition cards: 27–28

*Computapes*, SRA (1972)

Module 1, Lessons: AS 4, 7, 8, 9, 18, 20

*Mathematics Involvement Program*, SRA (1971)

Cards: 83, 93

*Skill through Patterns, level 2*, SRA (1974)

Spirit masters: 5, 13, 14, 21, 26, 43

*Visual Approach to Mathematics, level 2*, SRA (1967)

Visuals: 6, 10, 12

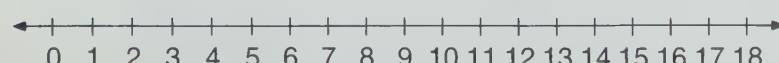
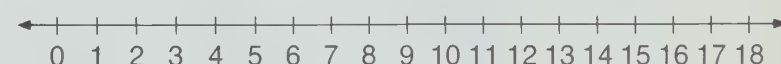
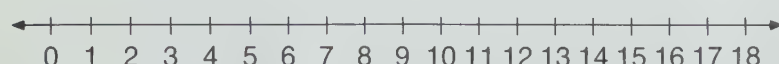
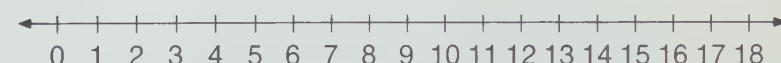
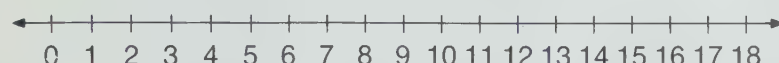
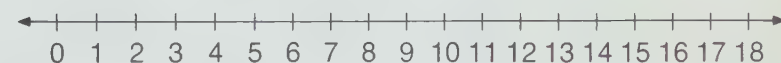
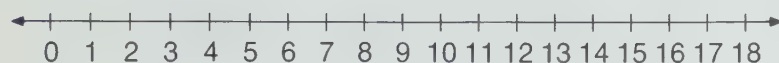
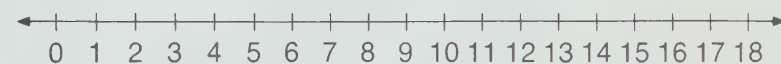
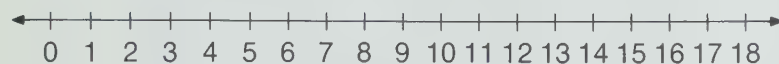
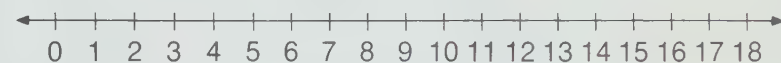
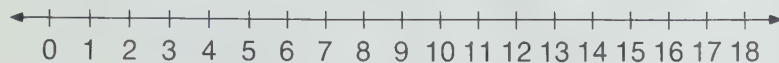
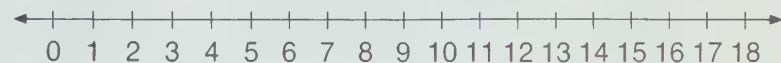
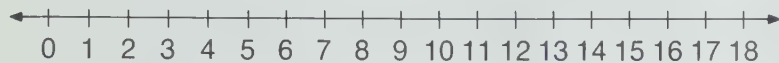
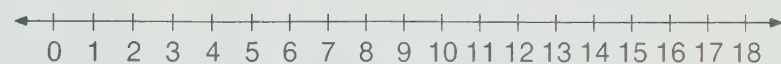
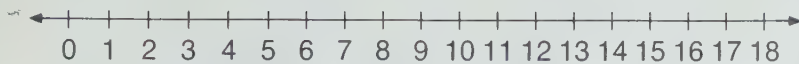
**other learning aids**—Balance Scale, Chip Trading, Fundamath



"Wow! PJ is almost 2 inches tall!"

The Family Circus by Bil Keane, reprinted courtesy of  
The Register and Tribune Syndicate






These number lines might help.





# Make a hundred line.

0	1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20	
21	22	23	24	25	26	27	28	29	30	
31	32	33	34	35	36	37	38	39	40	
41	42	43	44	45	46	47	48	49	50	
51	52	53	54	55	56	57	58	59	60	
61	62	63	64	65	66	67	68	69	70	
71	72	73	74	75	76	77	78	79	80	
81	82	83	84	85	86	87	88	89	90	
91	92	93	94	95	96	97	98	99	100	

4	9	v	
3	8	^	
2	7	#	
1	6	=	
0	5	10	

# Other Learning Aids

## whole-number concepts

**Inset Shapes Board** (set A) Sigma Scientific  
Shapes that promote the concepts of bigger than, smaller than, ordering, and so on.

**Keyboard Counter** Creative Publications  
Two sets of ten flip-up keys to illustrate groupings and sentences in addition and subtraction

**100 Number Board** Dick Blick  
A marked grid board and 100 numbered plastic tablets for counting and ordering

## whole-number notation

**Chip Trading** Creative Publications  
Activities to develop understanding of place value and renaming through a variety of manipulative activities

**Flip-A-Strip Place Value Chart** Developmental Learning Materials  
Large easel board with columns of strips for practice with place value and operations

**Number-Blox** Creative Publications  
Physical models that present place value

## whole-number operation

**Abacus Board** Creative Publications  
Board with pegs for learning the concepts of addition and subtraction

**Arithmetic Tube** Ideal  
Demonstrates sets of from 1 through 9 counters; addition and subtraction facts

### Balance Scale

Available from several sources; sets up weight experiments, develops addition and subtraction, and reinforces renaming concept

**Counting Blocks** Ideal

Multicolored one-inch wood cubes

**Counting Chips** Creative Publications

Plastic disks of eight colors to use in counting and sorting activities and in work with place value and simple computation

**Cuisenaire Rods** Cuisenaire

Rods of proportioned sizes to model patterns and number relationships

**Fundamath** Ideal

Demonstration board to illustrate basic whole-number operations

**Hainstock Blocks** Creative Publications

Ten blocks, one for each numeral 0 through 9 corresponding to the Cuisenaire colors, to illustrate all addition combinations with a 1-digit sum

**I Win** (Sets 1 and 2) Scott, Foresman

Phrase cards to pair with answer cards for addition and subtraction practice

**Make and Take Game** Singer-SVE

A board game to provide practice with addition and subtraction facts

**Match It Game** Singer-SVE

A board game to provide practice in numeral recognition and number sequence

**Mathfacts Games** Milton Bradley

Practice with the basic number facts

**Mini Veri-Tech** ETA

A twelve-tile minicomputer and problem books in game form to provide self-corrective practice with the basic facts

**Orbiting the Earth** Scott, Foresman

(addition and subtraction)  
Players toss numeral blocks and state basic facts correctly in order to move markers on a playing field

**Quizmo** (add-subtract) Milton Bradley

A lotto-type game for practice with addition and subtraction facts

**Plus n' Minus** Sigma Scientific

Self-testing device to reinforce basic addition and subtraction facts

**Tally and Difference** Math Shop

Games designed to provide practice with whole-number operations

## fraction concepts

**Fraction Circles** Ideal

A set of six circles with one frame, divided into fractional parts

**Fraction Squares** Ideal

A set of six squares with one frame, divided into fractional parts

**Visual Fraction Apparatus** Mind/Matter

Twenty ridged-fractional parts that show equivalent fractions

## geometry concepts

**Color & Shape Bingo** Sigma Scientific

A color-and-shape recognition game

**Geoboard Activity Cards** Creative Publications

Activity cards to help explore and compare geometric shapes and design

**Geoboard Classroom Kit** Cuisenaire

Individual boards and activity cards to help investigate geometric relationships

**Soap-film Shapes** SEE

Wire shapes that are dipped in soapsuds to make six different geometric-shaped bubbles

## measurement concepts

**Flannel Money Pieces** Instructo

A piggy bank, items to be bought and sold, and coins to be used on a felt board

**Judy Clock** General Learning

Movable hands and visible functioning gears to provide telling time experiences

**Judy Mini-Clocks** General Learning

Miniatures of the Judy Clock for pupil use

**Pay the Cashier Game** Garrard

A board game centered on counting, adding, and subtracting money in a store situation

**Trundle Wheel** Creative Publications

A tool to measure distance in yards or metres

**Willbrook Discovery Math Work Cards** ETA

Activity cards involving applications of weight, length, time, and capacity concepts

**Volume Relationships** (set 1) Sigma Scientific

Volume relationships are demonstrated as liquid is poured from one model to another



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# TABLE

## LENGTH



\*000020890448\*

1760 yards (yd.) = 1 mile

## METRIC

10 millimetres (mm) = 1 centimetre  
10 centimetres (cm) = 1 decimetre  
10 decimetres (dm) = 1 metre  
10 metres (m) = 1 dekametre  
10 dekametres (dkm) = 1 hectometre  
10 hectometres (hm) = 1 kilometre (km)

## AREA

144 square inches (sq. in.) = 1 square foot  
9 square feet (sq. ft.) = 1 square yard  
4840 square yards (sq. yd.) = 1 acre  
640 acres = 1 square mile  
1 square mile (sq. mi.) = 1 section  
(of land)  
36 sections = 1 township

100 square millimetres (sq. mm) = 1 square centimetre  
10,000 square centimetres (sq. cm) = 1 square metre  
100 square metres (sq. m) = 1 are  
100 square ares (a) = 1 hectare  
100 hectares (ha) = 1 square kilometre  
(sq. km)

## WEIGHT

16 drams (dr.) = 1 ounce  
16 ounces (oz.) = 1 pound  
2000 pounds (lb.) = 1 ton (tn.)

10 milligrams (mg) = 1 centigram  
10 centigrams (cg) = 1 decigram  
10 decigrams (dg) = 1 gram  
10 grams (g) = 1 dekagram  
10 dekagrams (dkg) = 1 hectogram  
10 hectograms (hg) = 1 kilogram  
1000 kilograms (kg) = 1 metric ton (t)

## VOLUME

1728 cubic inches (cu. in.) = 1 cubic foot  
27 cubic feet (cu. ft.) = 1 cubic yard  
(cu. yd.)

1000 cubic millimetres (cu. mm) = 1 cubic centimetre  
1000 cubic centimetres (cu. cm) = 1 cubic decimetre  
1000 cubic decimetres (cu. dm) = 1 cubic metre (cu. m)

## CAPACITY

### Liquid

2 cups (c.) = 1 pint  
2 pints (pt.) = 1 quart  
4 quarts (qt.) = 1 gallon (gal.)

### Dry

2 pints (pt.) = 1 quart  
8 quarts (qt.) = 1 peck  
4 pecks (pk.) = 1 bushel (bu.)

### Liquid and Dry

10 millilitres (ml) = 1 centilitre  
10 centilitres (cl) = 1 decilitre  
10 decilitres (dl) = 1 litre  
10 litres (l) = 1 dekalitre  
10 dekalitres (dkl) = 1 hectolitre  
10 hectolitres (hl) = 1 kilolitre



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